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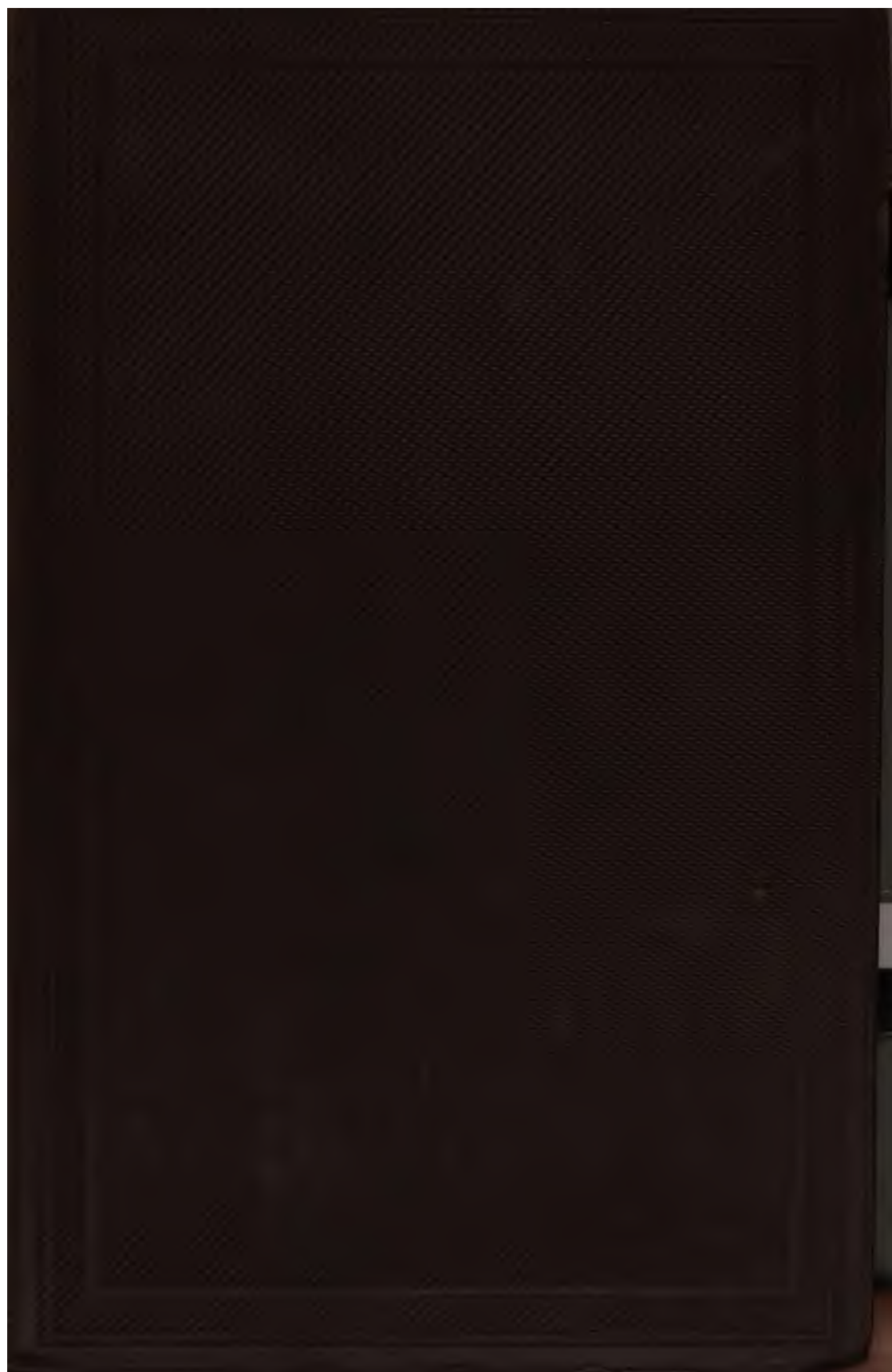
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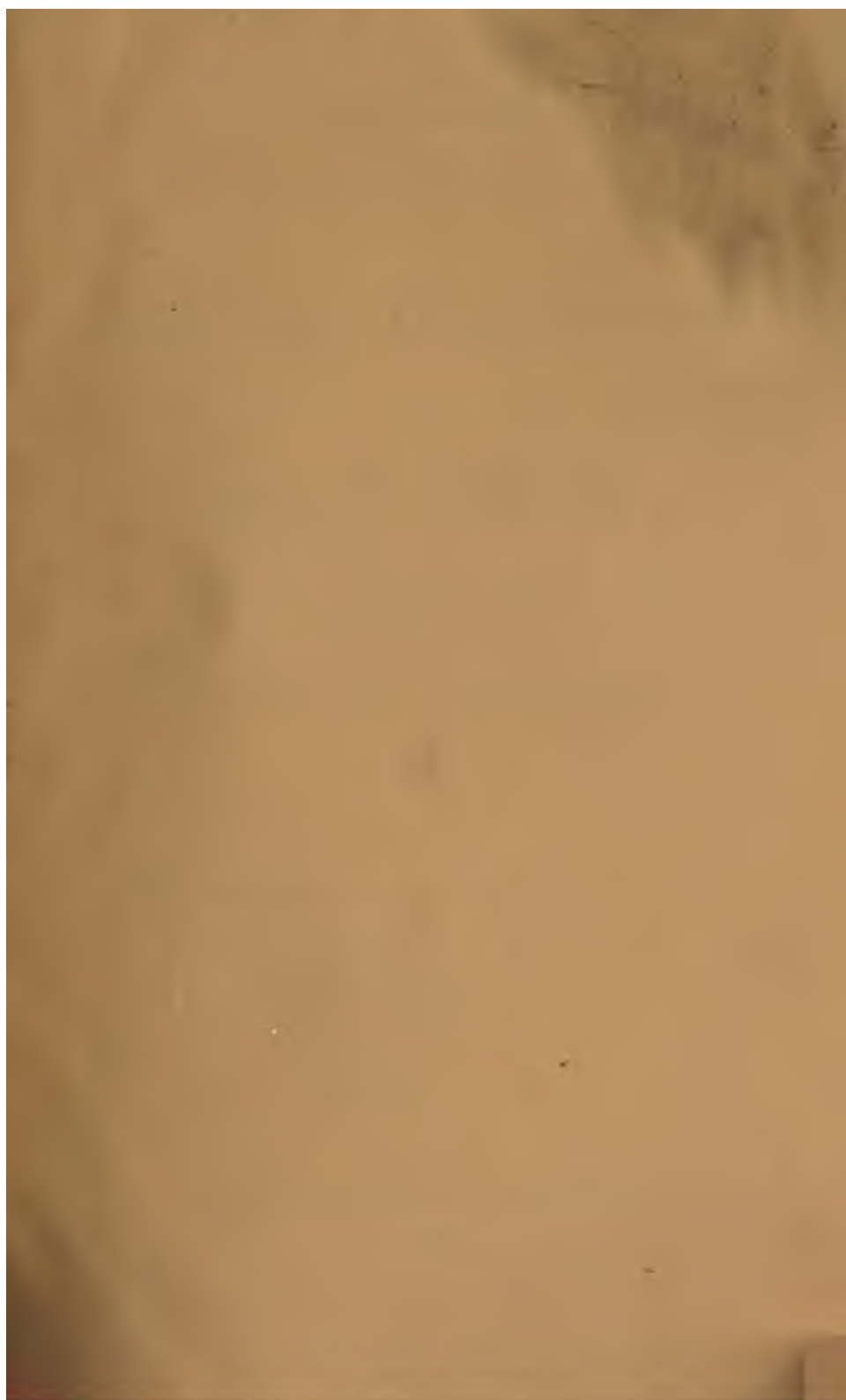


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CATALOGUE  
OF  
CARNIVOROUS, PACHYDERMATOUS,  
AND  
EDENTATE MAMMALIA  
IN THE  
BRITISH MUSEUM.

BY  
JOHN EDWARD GRAY, F.R.S., V.P.Z.S., F.L.S., &c.



LONDON:  
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## PREFACE.

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THIS Catalogue contains an account of all the specimens of Carnivorous, Thick-skinned, and Edentate Mammalia and their bones that are contained in the British Museum, and a description of the specimens which are contained in other collections, in order to show what are the species which are desiderata in the Museum Collection.

The woodcuts are the same as were prepared to illustrate the series of papers when they were first published in the 'Proceedings of the Zoological Society,' which have been kindly lent by the Council of the Society for the purpose.

JOHN EDWARD GRAY.

British Museum,  
February 12th, 1869.



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CATALOGUE  
OF  
CARNIVOROUS MAMMALIA  
(FERÆ, *Linn.*).

---

Order FERÆ.

Cutting teeth 6 in each jaw, regular, erect. Canine teeth one on each side of each jaw, conical. Grinders forming a regular continuous series, largest in the middle of the series.

Limbs exserted, with clawed feet; thumb non-opposable; the fore and hind limbs used for walking and climbing, rarely for swimming. Teats abdominal, 4 or more. Penis in a sheath.

Feræ, *Linn. S. N.*; *Fischer, Syn. Mamm.* xxv.

Carnivora genuina, *Cuvier, Règ. Anim.*

Falculatoria (part.), *Illiger, Prodr.*

The ferine Mammalia were divided by Cuvier and Illiger, according to the manner in which they walk, into *digitigrade* and *plantigrade Sanguinaria*; but this was found to separate very nearly allied genera.

Gray, "Arrangement of Mammalia," *Annals of Philosophy*, 1825:—

Order II. FERÆ.

Fam. FELIDÆ.

- I. 1. *Hyænina*: Hyæna, Pholetes.
2. *Felina*: Felis, Lynceus, Prionodon.

- II. 3. *Mustelina*: Putorius, Zorilla, Mephitis, Mustela, Lutra.  
 4. *Viverrina*: Viverra, Genetta, Herpestes, Crossarchus, Suricata, Paradoxurus, Ictides,  
 5. *Canina*: Canis, Fennecus, Lycaon.

## Fam. URSIDÆ.

- I. 1. *Ursina*: Ursus, Danis, Proctulus, Nilactos, Thalassactos.  
 2. *Procyonina*: Procyon, Nasua, ? Potos.  
 II. 3. *Gulorina*: Gulo, Galera, Grisonia, Mellivora.  
 4. *Mydaina*: Mydaus.  
 5. *Taxina*: Meles, Taxus.

*Synopsis of Suborders.*

- I. **Carnivora.** The grinders of three distinct forms; the premolars conical and separated from the hinder (tubercular) molars by a sharp-edged flesh-tooth with a tubercle on its inner edge.  
 II. **Omnivora.** The grinders similar, nearly of the same form, gradually passing into each other, only varying in size, from the false to the tubercular grinders, without any distinct sharp-edged flesh-tooth.

**Suborder I. CARNIVORA.**

The grinders of three distinct forms; the premolars conical and separated from the hinder (tubercular) grinders by a sharp-edged flesh-tooth with a tubercle on its inner side.

Sanguinaria, *Illiger, Prodr.*

Carnivora genuina digitigrada, *Cuvier, R. A.*

Felidæ, *Gray, Annals of Philosophy, 1825.*

I published an arrangement of the genera of the Viverridæ then known, according to the characters afforded by the hairiness or baldness of the soles of the hind feet, in the 'Proceedings of the Zoological Society' for 1832, p. 63, which is well adapted for the purpose, though, like other arrangements, it is not infallible nor to be used too strictly, or it will separate genera naturally allied to each other. The continued study of the subject has shown me several other characters which I had before overlooked. The following arrangement seems best adapted to exhibit the natural affinities of the genera as far as they can be shown in a linear series, and one that will enable the student to determine the species. The tribes characterized in the paper in the 'Proceedings of the Zoological Society' for 1832 may be divided into *two* groups, according to the hairiness of the toes and the form of the claws, characterized by the foot of the Cat, the Dog, and the Bear.

The bones of the toes of the animals of the first group, called *Ætiropoda*, as in the Cats, form an angularly arched line, the last phalange being bent up, so that the animal, when it walks, does not blunt its claws, which are only exerted when it wants to catch or tear some other animal.

In the second group, called the Dog-footed Carnivora (*Cynopoda*), the bones of the toes form a more or less extended, slightly arched line, and the claws, being always exposed, and worn when the animal walks, are more or less blunt at the tips. The more typical dog-footed animals often scratch holes in the ground; and some have strong, elongated, arched claws for this purpose.

The groups are well defined and very distinct, and the above characters are well marked in most of the genera. Some few genera have feet that seem nearly intermediate between the two groups. In such cases the whole appearance of the animals must be taken into consideration, and the genus placed in the group to which it seems most allied in habit and manners.

The animals of the different families which have sharp, retractile claws have habits in common. Thus the Cat (*Felidæ*), the Civet (*Viverridæ*), the *Ailuridæ*, and the *Cercoleptidæ* defend themselves by lying on their backs and using both their hind and fore feet to claw with; they walk softly and jump on their prey.

The animals with exerted claws generally scratch holes in the ground, and defend themselves with their front feet and teeth. Some, as the Suricates and the Bear, sit on their haunches; and the Bear, the Coati, the Raccoon, &c. use the fore feet as hands to take their food, as well as in defence.

The first group, the Cat-footed (*Æluropoda*), contains the following families:—*Felidæ*, *Viverridæ*, *Mustelidæ*, *Ailuridæ*, *Cercoleptidæ*, and *Procyonidæ*.

The Dog-footed, or *CYNOPODA*:—*Canidæ*, *Hyænidæ*, *Herpestidæ*, *Melinidæ*, and *Ursidæ*.

#### *Synopsis of the Families.*

Section I. **Cat-footed Carnivora** (*Æluropoda*). Toes short, regularly arched; the last phalanges bent up, withdrawing the claws into a sheath; claws sharp.

\* *Head short, rounded. Tubercular grinders 1.1, only in the upper jaw; false grinders 1 or 2 in each jaw. Nose simple, flat, naked, with a central groove below.*

Fam. 1. **FELIDÆ**. Head short, rounded. Tubercular grinders 1.1, in upper jaw; false grinders 2.2 in each jaw; the flesh-tooth subtrigonal, with a large internal lobe. Sole of heel hairy.

Fam. 2. **GUEPARDIDÆ**. Head short, rounded. Tubercular grinders 1.1, in upper jaw; false grinders 2.2 in each jaw; the flesh-tooth compressed, without any internal lobe. Sole of heel hairy.

Fam. 3. **CRYPTOPROCTIDÆ**. Head short, rounded. Tubercular grinders 1.1, only in the upper jaw; false grinders 3.3 in each jaw; flesh-tooth subtrigonal, with a distinct internal lobe. Sole of heel bald.



\*\* *Head elongate. Tubercular grinders in upper and lower jaws.*

Fam. 4. *VIVERRIDÆ*. Head elongate. Tubercular grinders 2.2 in the upper, and 1.1 in the lower jaw. The nose simple, flat, bald, and with a central groove beneath.

Fam. 5. *CYNOGALIDÆ*. Head elongate. Tubercular grinders 2.2 in the upper, and 1.1 in the lower jaw. Nose rather produced, rounded, hairy, and without any central groove below.

Fam. 6. *MUSTELIDÆ*. Head elongate. Tubercular grinders 1.1 in each jaw. Nose simple, its under surface flat, bald, with a central groove.

Section II. **Dog-footed Carnivora** (*Cynopoda*). The feet elongate. Toes straight; the last phalange and claws extended. The claws blunt and worn at the end; the front ones are often elongated. Head elongate.

Fam. 7. *MELINIDÆ*. Tubercular grinders one on each side of each jaw. Nose flat and bald beneath, with a central groove.

Fam. 8. *HERPESTIDÆ*. Tubercular grinders two on each side of the upper, and one on each side of the lower jaw. Nose flat and bald, beneath with a central groove.

Fam. 9. *RHINO GALIDÆ*. Tubercular grinders two on each side of the upper, and one on each side of the lower jaw. Nose broad, convex, and hairy, beneath without any central groove.

Fam. 10. *CANIDÆ*. Tubercular grinders two on each side of the upper and under jaws. Nose flat and bald, beneath with a central longitudinal groove.

Fam. 11. *HYÆNIDÆ*. Tubercular grinders one on each side of the upper jaw only. Nose flat and bald, beneath with a central longitudinal groove.

Fam. 12. *PROTELEIDÆ*. Tubercular grinders none in either jaw. The grinders very small, far apart. Nose broad.

	Cat-footed, <i>Æluropoda</i> .	Dog-footed, <i>Cynopoda</i> .
Tubercular grinder $\frac{1}{8}$ . . . . .	1. Felidæ. 2. Guepardidæ. 3. Cryptoproctidæ.	11. Hyænidæ.
Tubercular grinders $\frac{2}{7}$ . . . . .	4. Viverridæ. 5. Cynogalidæ.	8. Herpestidæ. 9. Rhinogalidæ.
Tubercular grinders $\frac{1}{4}$ . . . . .	6. Mustelidæ.	7. Melinidæ.
Tubercular grinders $\frac{2}{3}$ . . . . .		10. Canidæ.
Tubercular grinders $\frac{9}{10}$ . . . . .		12. Proteleidæ.

Section I. CAT-FOOTED CARNIVORA (*ÆLUROPODA*).

Toes short and regularly arched; the last phalange bent up, withdrawing the claws into a sheath. Claws sharp.

\* *Head short, rounded. Tubercular grinders 1.1, only in the upper jaw: false grinders 1 or 2 in each jaw. Nose simple, flat, and naked, beneath with a central longitudinal groove.*

## Fam. 1. FELIDÆ.

Head short, rounded. Tubercular grinders small, one on each side of the upper, and none in the lower jaw. The flesh-tooth with a well-marked, prominent internal lobe on the front part of its inner side. Legs moderate.

Tribe I. FELINA. Head oblong; face slightly produced. Legs moderate, nearly square.

Tribe II. LYNXINA. Head short, subglobose; face short. Legs elongate, hinder longest. Ears with a pencil of longer hairs.

The examination confirms the separation of several of the genera that have been proposed, and shows the distinctness of some species which it has been suggested should be united.

The British Museum Collection contains the skulls of a large number of species of *Felidæ*—the largest series of skulls of that group, I believe, that has ever been brought together—nearly twice as many as are figured in M. de Blainville's '*Ostéographie*,' which embraces figures of all the species contained in the French collections, in Paris and elsewhere. Of most of the species there are several examples, and almost all of them are obtained from the skins of the specimens in the collection: therefore there can be no doubt of the accuracy of their determination; and should any doubt arise, it can be solved by the examination of the skin from which the skull was obtained. Reference is made to the work in which the best figures of the skull of each species is to be found, and figures are added of some of the more interesting forms, which are now published for the first time.

The peculiarity in the formation of the skull, which separates the Lynxes from the Cats, is not very striking; but as it is common to the skulls of all the species of Lynxes, both from the eastern and western hemispheres, it shows how important it is to observe even slight differences.

In the *Felidæ* generally the upper processes of the intermaxilla and the front edge of the frontal bone on each side are provided with a more or less elongated conical process, which separates a part of the nasal from the maxilla; and in the Lynxes these processes are very slender and so much elongated that those of the intermaxillæ and the frontals nearly or quite unite and entirely separate the nasals



from the upper front edge of the maxillæ. This is not altogether peculiar to the Lynxes, the same structure being found in a Cat which has been called *F. marmorata*; and the process of the intermaxillary, often very long, reaches up one-third the length of the side margin of the nasal in some of the larger Leopards. But the lateral process of the frontal not being so long in *F. marmorata* as in the Lynxes, the two processes do not unite and separate the nasal bone from the maxilla as is found in all the species of the genus *Lyncus*.

The skulls of the species of true Cats are so similar and uniform in their structure that they present very few tangible characters for the separation of the species into groups. In looking at a small series of skulls it is easy to perceive that some are remarkable for having a broad rather lengthened nose and moderate-sized orbits, and others a narrow short nose, pinched up behind, and above with a more or less distinct concavity on the sides in front of the orbits, and the orbits generally large. The former structure is confined to the skulls of the larger species, as the Lion, Tiger, Leopard, Ounce; and the second is more marked in the small kinds. If a larger series of skulls is examined, the two forms gradually pass into each other, and it is found that the intermediate gradations of form occur in the skulls of some of the species that are intermediate in size between the two extremes; while some of the skulls of the middle-sized species retain the characters of the larger broad-nosed species.

In some species, while the skulls of the adult animals are similar to those of the larger broad-nosed group, the skulls of the younger or half-grown specimens have the sides of the nose more or less concave and narrower behind, like those of the second group.

The skull of a Chinese Leopard, presented by Dr. Lockhart, from Pekin, presents one of those anomalies in dentition which now and then occur in most families of Mammalia. It has a small subcylindrical short tubercular grinder behind the flesh-tooth on one side of the lower jaw, and none on the other, thus having on one side the formula of dentition that is peculiar to the genus *Canis*. But no one could make a mistake as to what it is, as the teeth are all those of the Cats (*Felidæ*).

The skulls of species of *Felis* which have the same system of colouring are not always alike: thus the skulls of *Felis uncia*, *F. marmorata*, and *F. macrocelis*, of *Felis viverrina*, *F. bengalensis*, and *F. nepalensis*, and of *F. pardina* and *F. macroura* are very different in form and structure. On the other hand, the skulls of the Lion, the Tiger, the Leopard, and the Jaguar are nearly similar in form and teeth, and chiefly to be distinguished by their size and other slight characters.

Keyserling and Blasius have pointed out the differences in the skulls of the Wild Cat and the Lynx of Europe. The characters mentioned are common to most of the species of the genera *Felis* and *Lyncus*; but *Felis marmorata* has a skull like that of the Lynxes; and the *Chaus* group, which have the pencilled ears of

the Lynxes, but not their long legs, have a skull like that of the Domestic Cat.

The *Felis macrocelis* has very long, rather compressed canine teeth in the upper and lower jaws. Its skull presents the nearest approach to those of the fossil Cats with very long sharp-edged canines, such as *Felis cultridens* of England, Germany, France, and Italy, *F. megatherion* and *F. smilodon* of Brazil. The latter has exceedingly long, sword-like canines in the upper jaw. These animals form the genera *Machairodus* and *Agnotherium* of Kaup (see Blainville, *Ostéographie, Felis*, t. 17 & 20).

In most *Felidæ* the orbits are furnished with an imperfect bony ring; in *F. viverrina*, *F. subrugosa*, *F. planiceps*, and some other spotted Cats these orbits are complete even at an early age.

The Domestic Cat has nocturnal eyes, with elongated erect pupils; and this has generally been given as the character of the entire genus; but the Lion, Tiger, Leopard, and some of the other larger species have round pupils, and do not, under any circumstances, ever contract them into an erect linear shape; so their eyes may be called diurnal eyes.

The Domestic Cat, and the species of the genus that are known to have nocturnal eyes with linear erect pupils when contracted, have very large eyeballs and large orbits in the skull, while the Lion and other Cats, which are known to have diurnal eyes, have moderate-sized eyeballs and orbits.

Observing that the Cats which are well known to have vertical pupils have large eyeballs and orbits in the skull, I have taken it for granted that all Cats which have large orbits in the skull have vertical pupils. This is important, as we can observe the size of the orbit in museums, while the form of the pupil can only be observed in the living animal. The animals which have nocturnal eyes, generally have short small faces to the skulls; but *Felis viverrina*, which certainly has nocturnal eyes, has a rather elongated nose to the skull.

As regards the form of the pupil in the *Felidæ* there is a great want of information. Years ago I remarked that, contrary to the general belief, the larger species, such as the Lion, the Tiger, the Leopard, the Jaguar, and some other species, had round pupils, and I therefore separated them from the true Cats, which had linear erect pupils; but the number of species that belonged to each group was left for further verification. Very few zoologists have noted the form of the pupils in the species they have described. Sometimes two observations on the same species do not coincide: thus Burmeister describes the pupils of the eyes of *F. jaguarondi* and *F. eyra* as round; but Berlandier represents the pupils of the latter (*F. eyra*) as linear and vertical. Then Mr. Hodgson has figured the pupil of *F. macrocelis* as circular; but Mr. Bartlett says that in the example living in the Society's Gardens it is oblong erect.

Mr. Bryan Hodgson had prepared by native artists a series of drawings of Nepalese animals from life, with the intention of pub-



lishing a 'fauna of Nepal.' These drawings he presented to the British Museum along with his large collection of specimens; and I find that the eyes of the Leopard, the Ounce, the Tortoise-shell Tiger (*F. macrocelis*), and the Murma Cat (*F. murmensis*) are represented with round pupils. The Viverrine Cat of the Tarai (*F. viverriceps*, Hodgs.), the small Nepal Cat (*F. nepalensis* and *F. pardochrous*, Hodgs.), the *F. nigripictus*, the Chaus (*Chaus lybicus*), and the Lynx of Thibet (*Lynx isabellina*, Blyth) are all represented with linear erect pupils.

Mr. Bartlett, in reply to my inquiries, kindly observes, "A great difficulty exists in determining the form of the pupils in the eyes of many of the Cats, as in some lights and conditions they are all round; it depends upon the light and other causes that you find them sometimes oblong. But, from careful and oft-repeated observation of the following list, I feel safe in saying that in the Ocelot, Puma, Jaguar, Leopard, Tiger, Lion, and Cheetah they are round, and in the Caracal, Clouded Tiger, Chaus, and Serval are oval.

"There are no others on your list that I can speak of with certainty."

"P.S. In my former list I told you the Ocelot had a round pupil. I have this day had the animal in the sunlight, and I must say the pupil of the Ocelot is oblong when exposed to the bright sunlight."

### Tribe I. True Cats—FELINA.

The head oblong; face slightly produced. Legs moderate, nearly of equal length. The skull oblong; intermaxillæ and frontal bones with short processes, which extend between the ends of the nasal bones and the maxillæ. The front upper false grinder small (rarely deciduous and wanting).

*Felina*, Gray, *P. Z. S.* 1867, p. 261.

A. Diurnal Cats.—*The eyes diurnal, with a round pupil. The orbits of the skull moderate-sized, compared with the size of the skull; face of the skull elongate, high, broad, flattened above.*

\* *Forehead of skull suddenly elevated above the line of the face.*

#### 1. UNCIA.

Skull broad; face broad, short, flat above; forehead suddenly raised; crown convex in front and on the sides, concave behind; nasal bones broad, short, not reaching so far back as the upper edge of the maxillæ; upper processes of the intermaxillæ rather elongate, extending about one-third up the sides of the nasals; orbits moderate, incomplete behind; canines conical, moderate; zygomatic arches very strong and high.

*Uncia*, Gray, *P. Z. S.* 1867, p. 262.

This genus is at once known from the Lion, Tiger, Leopard, and

Tortoise-shell Tiger by the shortness and breadth of the face, and the sudden elevation of the forehead. "Pupil round."—Hodgson.

Fig. 1.

*Uncia irbis.**Uncia irbis.*

B.M.

*Felis uncia*, Schreb.  
*Felis pardus*, Pallas.  
*Felis panthera*, Erzl.  
*Felis irbis*, Ehr.  
*Felis Tulliana*, Valenc.  
*Felis uncioides*, Hodgson.  
*Uncia irbis*, Gray, P. Z. S. 1867, p. 262. fig. 1 (skull).

*Hab.* Tibet (? Smyrna, Val.).

Skull imperfect behind, nearly to the occiput. Length  $6\frac{1}{2}$  inches, width  $4\frac{7}{8}$  inches.

\*\* *Nose on the same plane as the forehead.*

## 2. LEO.

Head, neck, sides of body, and legs maned. Tail elongate, tufted at the end. Pupils round. Skull—nose on the same plane as the forehead; nasals flat, nearly as long as maxillæ; the orbits of the skull moderate, incomplete behind.

Leo, Gray, P. Z. S. 1867, p. 263.

*Leo nobilis.*

B.M.

*Felis leo*, Linn.  
*Leo africanus et L. persicus*, Swains.

*Leo gambianus*, Gray.  
*Leo goorgrattensis*, Gmel. &c.  
*Leo nobilis*, Gray, *P. Z. S.* 1867, p. 263.  
*Blainv. Ostéogr. Felis*, t. 5 & 9.

*Hab.* Asia; Africa.

Skull, length  $14\frac{1}{2}$  inches, width  $9\frac{5}{8}$  inches.

### 3. TIGRIS.

Cheeks with spreading whiskers. Tail elongate, tapering at the end. Pupils round. Skull—nose on same plane as the forehead; orbits of the skull moderate, incomplete behind. Nasals very large, reaching beyond the back edge of the maxillæ. Internal nostrils broad. Palate truncated behind.

*Tigris*, Gray, *P. Z. S.* 1867, p. 263.

#### *Tigris regalis.*

B.M.

*Felis tigris*, Linn.  
*Tigris regalis*, Gray, *P. Z. S.* 1867, p. 263.  
*Blainv. Ostéogr. Felis*, t. 7.

*Hab.* Asia.

Skull, length 14 inches, width  $10\frac{1}{8}$  inches.

### 4. LEOPARDUS.

Hair of head and neck uniform. Tail elongate (rarely shorter than the body). Pupils round. Orbits of the skull moderate, incomplete behind. Nose on same plane as the forehead. The upper process of the internaxilla very narrow, and much produced up the side of the maxilla, often one-third the length of the nasal.

*Leopardus*, Gray, *P. Z. S.* 1867, p. 263.

† *Large rose-spotted Leopards.*

#### 1. *Leopardus pardus.*

B.M.

*Felis leopardus*, F. varia, et F. uncia, Schreb.  
*Felis pardus*, Linn.  
*Felis panthera*, Erxl.  
*Felis chalybeata*, Herm.  
*Felis minor*, Ehr.  
*Felis antiquorum*, Fischer.  
*Felis pœcilura*, Valenc.  
*Felis palæopardus*, Fitz.  
*Leopardus pardus*, Gray, *P. Z. S.* 1867, p. 263.  
*Blainv. Ostéogr. Felis*, t. 8; *Temm. Monogr.* t. 9. f. 1, 2.

*Var.* Black.

*F. melas*, Péron; *F. fusca*, Meyer.

*Hab.* Southern Asia; North, South, and West Africa.

Pupil round.—*Bartlett; Gray.*

Very variable in the size and number of the spots. Skull—nasal elongate, back edge in a line with back edge of maxilla; internal nostril rather narrow. Length  $9\frac{1}{4}$  inches, width  $5\frac{5}{8}$  inches.

2. *Leopardus japonensis*.

B.M.

*Leopardus japonensis*, Gray, *P. Z. S.* 1862, p. 262, t. 33; 1867, p. 264.

*Hab.* Japan.

3. *Leopardus chinensis*.

B.M.

*Leopardus chinensis*, Gray, *P. Z. S.* 1867, p. 264, fig. 2 (skull).

*Hab.* Pekin, mountain-forests of the west.

Skull (in British Museum) very like that of a leopard, but shorter; and the nose, instead of being nearly flat, is regularly arched before the orbits. Length  $6\frac{7}{8}$  inches, width  $4\frac{5}{8}$  inches. Nasal wide, flat; apex produced rather behind the back edge of the maxilla. Process of the intermaxilla very slender, short; forehead broad, convex.

Fig. 2.



*Leopardus chinensis*.

There are two or three skulls of Leopards in the Museum, received from the Utrecht collection, without habitats, that rather resemble the Pekin specimen, which was presented to us by Dr. Lockhart. They may be the skulls of *L. brachyurus*.

4. *Leopardus onca*.

B.M.

*Felis onca*, Linn.

*Felis panthera*, Schreb.; Cuvier, *Oss. Foss.* t. 34. f. 3, 4.

Jaguar, Buffon.

*Leopardus onca*, Gray, *P. Z. S.* 1867, pp. 264, 402.



## Var. 1.

*Leopardus Hernandezii*, Gray, P. Z. S. 1857, p. 278, t. 18; 1867, p. 402; *Blainv. Ostéogr. Felis*, t. 3.

*Hab.* South America.

Pupil round.—*Bartlett*.

Skull—nasals broad, their hinder end and the back edge of maxillæ nearly in a line; forehead convex; nose broad, flat above; orbit with a prominence in the middle of the front or nasal edge. Length 9 inches, width 6 inches.

Var. 2. Black. Skull, length  $9\frac{1}{2}$  inches, width  $6\frac{3}{4}$  inches.

*Felis nigra*, *Erxl.*

*Hab.* Brazil.

The skull of the Jaguar (*Felis onca*, Linn.) is known from the skulls of all the other species of the genus *Leopardus*, and from the Lion and the Tiger, by having a distinct, but more or less developed, tubercle (probably for the attachment of one of the muscles of the eyeball) on the middle of the inner or nasal edge of the orbit; and there is also a well-marked half-ovate notch in the middle of the truncated front edge of the internal nostril, which is not so distinctly developed in other large feline animals.

The specimen which I described under the name of *Leopardus Hernandezii* in the Proc. Zool. Soc. (1857, p. 278, Mamm. t. 58), from Mexico, has come into the British Museum collection; and I cannot find any difference in the skull to distinguish it from the other specimens of the Jaguar; so I suppose it must be considered one of the varieties of that species, marked by the distance at which the small spots are placed from each other, only now and then forming anything like a distinct ring or row of spots.

†† Large one-coloured Cats.

5. *Leopardus auratus*.

B.M.

*Felis aurata*, *Temm.*

*Felis chrysotricha*, *Temm.*

*Felis moormensis* et *F. murmensis*, *Hodgson*.

*Junior.* *Felis Temminckii*, *Vigors*.

*Leopardus auratus*, Gray, P. Z. S. 1867, p. 265.

*Hab.* Himalaya, Sumatra; Borneo.

Pupil round.—*Hodgson*.

6. *Leopardus concolor*.

B.M.

*Felis concolor*, *Linn.*

*Felis discolor*, *Schreb.*

*Felis puma*, *Shaw*.

*Felis fulva*, *Brisson*.

*Puma*, *Penn.*

*Leopardus concolor*, Gray, P. Z. S. 1867, p. 265.

*Blainv. Ostéogr. Felis*, t. 6; *Baird, Mam. N. A.* t. 71 (skull).



*Var.* Black.

*Hab.* North and South America.

Pupil round.—*Bartlett*.

Skull, length  $7\frac{7}{8}$  inches, width  $5\frac{3}{8}$  inches. Nasals rather narrow, with a central sunken line rather behind the back end of maxillæ; cheeks in front of the orbits rather concave; the upper part of the intermaxilla much produced up the side of the nasal for one-third the length of that bone.

### 5. NEOFELIS.

Skull elongate; face broad, rather produced, on the same plane as the forehead. Nasal large, elongate. Orbit moderate, very incomplete behind. Lower jaw truncated and high in front. Canine teeth, upper and lower, very long, conical, with a sharp cutting hinder edge; the front upper and lower false grinders distinct, early deciduous. The front lateral process of the frontal bone rather elongate. The hinder entrance to the nostrils very narrow, elongate; sides parallel; front edges rounded. Pupil round (*Hodgson*), oblong erect (*Bartlett*).

*Neofelis*, *Gray*, *P. Z. S.* 1867, p. 265.

Fig. 3.



*Neofelis macrocelis*.

This skull most nearly resembles that of the celebrated fossil *Felis smilodon* (Blainv. *Ostéogr. Felis*, t. 20), with a very much elongated upper canine.

#### 1. *Neofelis macrocelis*.

B.M.

*Felis macrocelis*, *Temm*.

*Felis Diardii*, *Desmoul*.

*Felis macroceloides*, *Hodgson*.

*Felis nebulosa*, *H. Smith*.

*Neofelis macrocelis*, *Gray*, *P. Z. S.* 1867, p. 266, fig. 3 (skull).

*Hab.* Himalaya (*Hodgson*); Malacca (*Temm.*); Siam.

Pupil oval.—*Bartlett*.

Skull: length  $7\frac{3}{4}$  inches, width  $4\frac{3}{4}$  inches.

*Var.* Smaller. Skull, length 5 inches, width  $3\frac{1}{2}$  inches (adult).

*Hab.* Siam.

## 2. *Neofelis brachyurus*.

B.M.

*Leopardus brachyurus*, *Swinhoe*, *P. Z. S.* 1862, p. 352, t. 43.

*Neofelis brachyurus*, *Gray*, *P. Z. S.* 1867, p. 265.

*Hab.* Formosa (*Swinhoe*).

- B. Nocturnal Cats.—*The pupil of the eye oblong or linear erect when contracted; the eyeball large. The orbits of the skull large for the size of the face. The nose of the skull generally short, compressed above behind, with a more or less marked concavity in front of the orbits.*—*Gray*, *P. Z. S.* 1867, p. 266.

In some genera and species the orbits of the eyeballs are much larger, compared with the size of the face and skull, than in others.

\* Skull short and high.

## 6. PARDALINA.

Face round. Eyes moderate; pupil — ? Skull short, high; face short; forehead arched in front; brain-case swollen, short; orbits moderate, incomplete behind. First upper false grinder small. Canines conical, moderate. Hinder aperture to the nose truncated in front.

*Pardalina*, *Gray*, *P. Z. S.* 1867, p. 266.

This genus differs from *Leopardus* in having a much shorter-faced skull.

### *Pardalina Warwickii*.

B.M.

Fur short, dusky whitish brown; chin, streak on cheek, and throat white; chest and underside paler, black-spotted; crown and nape with four, cheek with two, and between the withers one black streak; the four feet and body covered with very numerous, equidistant, nearly equal-sized small black spots; throat, chest, upper part of the inside and outside of fore and hind legs black-banded; tail spotted at the lower half, ringed at the end, with a black tip; ears black, with a large white spot.

*Leopardus himalayanus*, *Gray*, *Cat. Mamm. B. M.* p. 44.

"*Felis himalayanus*, *Warwick*," *Jardine's Nat. Libr.* t. 24 (not good).

*Felis viverrina*, var., *Blyth*.

*Pardalina Warwickii*, *Gray*, *P. Z. S.* 1867, p. 267.

*Hab.* Himalaya (*Cross*, *Warwick*).

Skull short, broad, length  $4\frac{1}{3}$  inches, width 3 inches 2 lines; face short, broad; nasals moderately broad; forehead convex, rhombic;

orbits rather small, incomplete behind. The skull is very unlike that of *Felis viverrina*.

Fig. 4.

*Pardalina Warwickii.*

There is in the British Museum a Cat that was formerly alive in the Surrey Zoological Gardens, and was there called the Himalayan Cat, and which, in the 'List of Mammalia in the British Museum,' published in 1842, I called *Leopardus himalayanus*. This animal is figured, from the specimen at the Surrey Zoological Gardens, in Jardine's 'Naturalist's Library' as *Felis himalayanus*, Warwick. The figure is by no means a characteristic one. The Cat has not been brought from Himalaya by any of the numerous sportsmen and collectors that have searched that country. It is not known to Mr. Blyth, nor to any other Indian zoologist to whom I have shown it; indeed Mr. Blyth states that he believes it to be a South American Cat.

The examination of the skull shows that it forms a group by itself; and in my paper in Proc. Zool. Soc. 1867, p. 266, I formed for it a genus under the name of *Pardalina*. As the species has not been well described, I have given a description of the type specimen.

#### 7. CATOLYNX.

Head round. Ears rounded. Pupil oblong erect. Tail very long, cylindrical. Skull ovate; face short, rather broad; nose slightly flattened on the sides; forehead arched; the nasal bones moderate, elongate, separated from the maxillæ by the long slender processes of the intermaxillæ and frontal bones. First upper false grinder small, distinct. Orbits large, subcircular, complete or nearly complete behind. Internal nostril narrow, arched in front.

Catolynx, Gray, P. Z. S. 1867, p. 267.



This genus is peculiar for having the same form of the nose-bones as the Lynxes.

### 1. *Catolynx marmoratus*.

*Felis marmoratus*, *Martin*.

*Felis Diardii*, *Jardine*.

*Felis Ogilbii*, *Hodgson*.

*Felis longicaudatus*, *Blainv. Ostéogr. Felis*, t. 9 (skull).

*Catolynx marmoratus*, *Gray, P. Z. S.* 1867, p. 267.

*Hab.* India; Borneo.

### 2. *Catolynx Charltoni*.

*Felis Charltoni*, *Gray, P. Z. S.* 1856, p. 396.

*Catolynx Charltoni*, *Gray, P. Z. S.* 1867, p. 268.

*Hab.* Nepal; Darjeeling (*Charlton*).

The spotting of this species is rather different from that of *F. marmoratus*; they may be only local varieties.

The separation of the nasals from the maxillaries is uniform in all the six specimens of this skull in the British-Museum collection.

\*\* *Skull elongate; face and brain-case elongate.*

### 8. *VIVERRICEPS*.

Head rather elongate. Ears rounded, not pencilled. Eyes nocturnal; pupil erect, linear. Fur spotted. Tail moderate, tapering. Skull elongate; face produced, narrow above, concave on the sides in front of the orbits; orbits rather large, complete behind; nasal bones elongate, very narrow above. Canines conical, moderate.

*Viverriceps*, *Gray, P. Z. S.* 1867, p. 268.

*Hab.* Asia.

There are small-sized Spotted Asiatic Cats which have a long head, with an elongated skull, and complete bony orbits. The skulls are longest and the orbits more developed in the *Felis viverrina* of Bennett and the *Felis planiceps* of Vigors and Horsfield. But, besides these, *Felis rubiginosa* of I. Geoffroy, in Bélanger's 'Voyage,' and the Cat which I described under the name of *Leopardus Elliotti* in the 'Annals and Mag. of Nat. Hist.' for 1837 (x. p. 260) have a rather elongated skull and complete orbits, though Mr. Blyth regards *F. Elliotti* as only a variety of his *F. bengalensis*.

† *Skull elongate; nose long.*

### 1. *Viverriceps Bennettii*.

*Felis viverrina*, *Bennett, P. Z. S.* 1833, p. 68.

*Felis viverriceps*, *Hodgson*.

*Felis bengalensis*, *B. Hamilton*.

*Felis himalayana*, *Jardine*.

*Felis celidogaster*, *Gray, List of Hodgson's Collection, B. M.* (not Temm.).

*Viverriceps Bennettii*, *Gray, P. Z. S.* 1867, p. 268. fig. 5.

*Hab.* East Indies.

Pupil linear erect.—*Hodgson*.

Skull, length 5 inches 5 lines, width 3 inches 8 lines.

Fig. 5.



*Viverriceps Bennettii*.

†† Skull—nose shorter, concave on sides.

## 2. *Viverriceps planiceps*.

*Felis planiceps*, *Vigors & Horsfield*, *Zool. Journ.* vii. t. 2; *Blainv.*

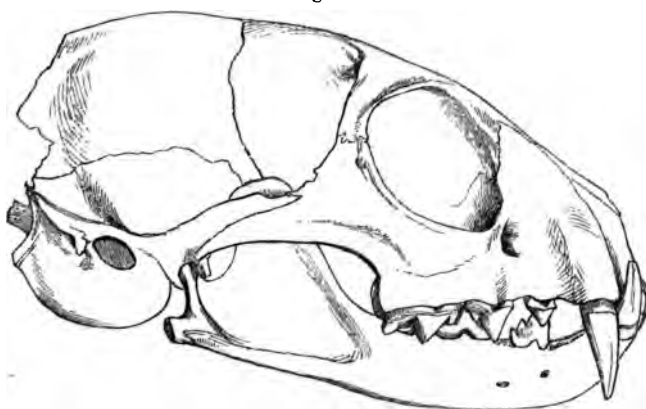
*Osteogr. Felis*, t. 9.

*Felis Diardii*, *Crawford*.

*Viverriceps planiceps*, *Gray*, *P. Z. S.* 1867, p. 269. fig. 6.

*Hab.* Malacca; Sumatra; Borneo.

Fig. 6.



*Viverriceps planiceps*.

Skull elongate; crown flat, rhombic; face rather produced, broad; the orbits moderate, complete behind. Length of adult  $3\frac{3}{4}$  inches, width 2 inches 5 lines. Very like that of *F. viverrina*.

### 3. *Viverriceps Elliotti*.

*Leopardus Elliotti*, Gray, *Ann. & Mag. N. H.* x. p. 260.

*Felis bengalensis*, var., Blyth?

*Viverriceps Elliotti*, Gray, *P. Z. S.* 1867, p. 269.

*Hab.* Madras.

Skull elongate; crown flat, rhombic; face concave in front of the orbits; orbits moderately complete behind.

The skull very like that of *F. rubiginosa*, but larger, 3 inches 10 lines long, and 2 inches 7 lines wide.

### 4. *Viverriceps rubiginosa*.

*Felis rubiginosa*, I. Geoffr. *Voy. Bélanger*, t.

*Viverriceps rubiginosa*, Gray, *P. Z. S.* 1867, p. 269.

*Hab.* India; Madras.

Skull 2 inches 10 lines long, 2 inches wide at the back of the zygomatic arches; crown flat, rhombic.

### 9. PAJEROS.

Head elongate. Ears rounded. Pupil round?? Skull elongate and swollen behind; face short, broad; orbits moderate, incomplete behind. The front upper false grinder very early deciduous, always wanting in the half-grown skull.

*Pajeros*, Gray, *P. Z. S.* 1867, p. 269.

The skull of the *Pajeros* is like that of the Common Cat; but the orbits are small, as in the other diurnal Cats, and the face broader, and the brain-case is rather more produced behind; but it differs from that of the Leopards and Cats in the upper front false grinders being very early deciduous, as in the Lynxes.

In the four skulls in the Museum the holes for these teeth are only to be observed in the skull of a very young animal; in the other three older skulls the holes even are obliterated.

### *Pajeros pampanus*.

*Felis pajeros*, Desm. *Mamm.* p. 231.

*Pajeros pampanus*, Gray, *P. Z. S.* 1867, p. 269.

*Hab.* South America; The Pampas.

Skull elongated; face short, broad, slightly concave in front of the orbits; nasal broad below, suddenly narrowed above; orbits moderate, incomplete behind; brain-case rather swollen; forehead slightly convex, rhombic. Length 4 inches 2 lines, width 2 inches 4 lines.

The skull differs from that of the common *Felis domestica* in the orbits being smaller and the brain-case larger.

\*\*\* *Skull ovate ; face short ; brain-case moderate.*

### 10. FELIS.

Tail cylindrical, elongate, sometimes shorter than the body. Ears oblong, rounded at the tip, without any pencil of hairs. Pupil erect, linear. Skull moderate; face short, conical; nose moderate, narrow above behind, concave in front of the orbits; brain-case oblong, broad; front upper false grinders distinct, small; orbits large, or very large, incomplete.

*Felis*, Gray, *P. Z. S.* 1867, p. 270.

† *Moderate-sized large-headed Cats, with lines of spots on the sides.*  
Pardalis, or Ocelots.

Face of skull elongate.

Pupil round, oblong, erect in sunlight.—*Bartlett.*

#### 1. *Felis pardalis.*

B.M.

*Felis pardalis*, Linn.; *Baird, Mam. N. A.* p. 87, t. 72 (skull); *Gray, P. Z. S.* 1867, p. 270.

? *Felis armillata*, F. Cuvier.

? *Felis Griffithsii*, H. Smith.

*Hab.* America, tropical or subtropical.

Skull, adult, length  $5\frac{1}{2}$ , width  $3\frac{1}{2}$  inches.

#### 2. *Felis grisea.*

B.M.

*Leopardus griseus*, Gray, *Ann. & Mag. N. H.* x. p. 260, 1842.

*Felis grisea*, Gray, *P. Z. S.* 1867, pp. 270, 403.

*Hab.* Guatemala.

Skull, adult, length  $5\frac{1}{8}$ , width  $3\frac{3}{8}$  inches. Nose rather concave on the sides before orbits.

#### 3. *Felis melanura.*

B.M.

*Felis melanura*, Ball, *P. Z. S.* 1844, p. 128; *Gray, P. Z. S.* 1867, pp. 270, 403.

*Hab.* America.

Skull, adult, length  $5\frac{1}{2}$ , width  $3\frac{1}{2}$  inches.

The skulls of these three species are very similar, only differing a little in size; perhaps they are only local varieties of the same species.

#### 4. *Felis picta.*

B.M.

*Leopardus pictus*, Gray, *Ann. & Mag. N. H.* x. p. 260, 1842.

*Felis picta*, Gray, *P. Z. S.* 1867, pp. 271, 403.

*Hab.* Central America.

Skull, length  $5\frac{1}{2}$ , width  $3\frac{1}{2}$  inches.



5. *Felis pardoides*.

B.M.

The fur is grey, with a very large number of nearly equal-sized round or oblong dark spots; the spots on the loins and rump are larger, with a pale centre; the cheeks and nape with black streaks; belly white, with large black spots; tail ringed. Length of body and head 26, tail 13 inches.

*Felis pardoides*, Gray, *P. Z. S.* 1867, p. 403.

*Hab.* Tropical America.

The skull of *F. pardalis* and the typical specimens of *F. grisea* and *F. melanura* are very similar in shape, size, and structure. The nasal bones vary in shape; in some skulls they are short, broad, and gradually attenuated; in others the nasal bones are longer, very broad in front, and then suddenly narrowed at about half their length; but the different skulls vary in this respect, and the two forms gradually pass into each other.

The skull of an adult *F. pardalis* is 5 inches long and  $3\frac{1}{2}$  inches wide, of the typical *F. grisea*  $5\frac{1}{8}$  inches long and  $3\frac{1}{4}$  inches wide; the nose rather concave on the sides behind. In the typical *F. melanura* the length of the adult skull is  $5\frac{1}{2}$  inches, width 3 inches 7 lines; intermaxillæ elongated; orbits moderate, incomplete behind; face broad, rather produced.

The Ocelots are extremely variable; and though there is a very large series of specimens in the British Museum, I cannot make up my mind whether they are all one, or whether there are three or more species. There are two most distinct varieties as regards size—the large Ocelots, with very large heads, and the smaller Ocelots, with more moderate-sized heads; but each variety presents several variations of colour, and there are examples intermediate in size. The differences in the size of the Ocelots may depend on the temperature, the geographical disposition, and the abundance or scarcity of food in the district which they inhabit. I can well believe that the large variety is as dangerous and destructive as the Jaguar, as travellers assert.

*Leopardus pictus* (Mag. N. H. x. p. 260, 1842) is one of the larger kind, and it has the spots very different from those of any other specimen in the collection; but this is such a difference as one may expect to find only a variation when one examines a large series of specimens.

*Leopardus griseus* (Mag. N. H. x. p. 260, 1842) differs from the other Ocelots in having a grey fur with whitish sides. There are several specimens which agree in this peculiarity. The grey specimens offer several variations in the spotting, like the fulvous specimens. One specimen has a rather yellow tint in the middle of the back; otherwise the grey colour seems permanent. Mr. Blyth has observed that the smaller and darker Spotted Cats become more fulvous as they attain full age; but that cannot explain the greyness

of these specimens, as there are adult as well as young specimens of the grey colour.

*Felis melanura* (Ball, P. Z. S. 1844, p. 128) is a most strongly marked specimen, and in the whole series of specimens in the Museum stands alone for the intensity and clearness of the markings, both black, white, and fulvous. It may be a variety in which the colours, especially the black, are very much more developed than usual, and therefore the spots have become confluent, until the whole animal may be described as black with white and fulvous spots. It is not the common melanism, where the whole fur has become more or less black, the black spots being only a little more intense. We have an Ocelot of this latter variety in the British Museum; but it bears no resemblance to the type specimen described by Mr. Ball, which is also in the Museum collection.

In the British Museum there is a very small Spotted Ocelot, which is here recorded as a species or variety under the name of *F. pardoides*.

The species or varieties are to a certain extent permanent; the young, in some instances at least, are like their parents; and the markings do not change with age (that is to say, they are the same on the kitten as on the adult); and there are adult specimens that are grey as well as fulvous, or fulvous and white; so that the grey colour does not depend on the youth of the specimen, as has been suggested.

†† *Smaller, small-headed, spotted American Cats.* Margay.

Three species of small Spotted Cats have been described as inhabiting South and Tropical America. All these three species may be distinguished from the Ocelots (*Felis pardina*) by the smaller size of the head, and the spots not being united together in chains; but the latter character is not to be observed in all Ocelots. As these Cats, like the other Spotted Cats, vary greatly in the form, size, and disposition of the spots, the determination of the species has been attended with considerable difficulty, and it has been suggested that perhaps there are more than one species of the long-tailed American Tiger Cat called *F. macroura*. There is a very large series of specimens of the long-tailed species in the British Museum (two Chatas and several Margays) from different localities. And if there were not so many offering such different variations of the first species in the collection (I had only a few selected specimens to describe from), I should have been inclined to separate them into more than one species; indeed, in 1842, when we had only four or five specimens, I did name one in the 'List of Mammalia' as a distinct species under the name of *Leopardus tigrinoides*.

These three species may be easily distinguished from each other by the kind and colour of the fur, and the colour and length of the tail. Thus *F. macroura* and *F. mitis* have soft bright fulvous fur,

and tail distinctly ringed; and *F. tigrina* has a harsher grizzled fur, and the tail marked with series of dark spots, not forming distinct rings. They may be characterized thus:—

#### 6. *Felis macroura*. (The Kuichua.)

Fur soft, bright fulvous, black-spotted; spots variable in shape and size, often with a pale centre; tail elongate, cylindrical, longer than the body, with from eight to ten broad, well-marked, often interrupted, black rings, and a black tip.

Skull, adult, 4 inches long, 2 inches 2 lines wide. The nasals narrow, with the outer edges curved inwards.

*Felis macroura*, *Pr. Max. Abhild.* t. ; *Gray*, *P. Z. S.* 1867, p. 271.

*Felis Wiedii*, *Schinz.*

"*Felis brasiliensis*, *Cuvier.*"

*Var.* Paler, spots larger.

*Leopardus tigrinoides*, *Gray*, *List. Mamm. B. M.* 1842, p. 42.

*Hab.* Brazil.

#### 7. *Felis mitis*.

B.M.

Fur soft, bright fulvous, black-spotted; spots variable in size and disposition, often with a pale centre; tail cylindrical, rather tapering at the end, nearly the length of the body without the head, with six well-marked, broad, sometimes interrupted black rings, and a black tip.

*Felis mitis* (Chati), *F. Cuv. Mamm. Lithogr.* t.; *Gray*, *P. Z. S.* 1867, p. 271.

*Felis chati*, *Griffith.*

*Jaguar*, *Buffon*, *H. Nat.* ix. t. 18.

*Felis onca*, *Schreb.* (from *Buffon*).

*Hab.* Mexico? Paraguay?

#### 8. *Felis tigrina*.

B.M.

Fur rather harsh, dull, grizzled, varied with black spots and rings varying in size and form; tail moderate, nearly as long as the body, cylindrical, rather thick, truncated at the end, marked with small black spots often confluent but not forming continuous rings.

Skull as in *F. macroura*; the nasals rather wider, and the orbits not quite so large, compared with the size of the skull. Length about  $3\frac{1}{2}$  (rather imperfect behind), width  $2\frac{1}{2}$  inches.

*Felis tigrina*, *Schreb.* t. 100; *Buffon*, *H. N.* xiii. t. 38; *Gray*, *P. Z. S.* 1867, p. 271.

*Felis margay*, *Griffith.*

*Felis guigna*, *Molina.*

*Margay*, *Buffon.*

*Hab.* South America.



9. *Felis Geoffroyii*.

*Felis Geoffroyii*, *D'Orb. Voy. Amér. Mérid.* t. 13 (skull); *Gray, P. Z. S.* 1867, p. 272.

*Hab.* South America.

10. *Felis colocola*.

*Felis colocola*, *Molina*; *F. Cuv. Mamm. Lith. t.* ; *Gray, P. Z. S.* 1867, p. 272.

*Hab.* South America; Chili (*Molina*); Surinam (*H. Smith*).

+++ *Smaller one-coloured American Cats.* "American Tigers."

11. *Felis jaguarondi*.

B.M.

*Felis jaguarondi*, *Lacép.*; *Gray, P. Z. S.* 1867, p. 272.

*Felis mexicana*, *Desm.*

*Felis calomitli*, *Baird, Mam. N. A.* t. 74. f. 2 (skull, adult).

*Hab.* South America.

Skull, B.M.

Pupil round.—*Burmeister*.

In *Blainville's* figure the nose is much higher and forehead flatter than the skulls in the British Museum.

12. *Felis eyra*.

*Felis eyra*, *Desm.*; *Gray, P. Z. S.* 1867, p. 272.

*Felis unicolor*, *Trail, Baird, Mam. N. A.* t. 73. f. 2 (skull, young).

*Hab.* Tropical America.

Skull, B.M.

Pupil round.—*Burmeister*. Pupil linear and vertical.—*Berlandier*.

++++ *Moderate-sized, African, spotted Cats.* Cheeks without the check-streaks. Skull—face rather produced. Serval.

13. *Felis serval*.

B.M.

*Felis serval*, *Schreb.*; *Gray, P. Z. S.* 1867, p. 272.

*Felis capensis*, *Forst.*

*Felis galeopardus*, *Desm.*

*Serval, Buffon.*

*Chaus servalina*, *Gerrard, Blainv. Ostéogr. Felis*, t. 16.

Length of skull 5 inches, width  $3\frac{1}{4}$  inches. Nasals large.

Pupil oblong, erect.—*Bartlett*.

*Hab.* South and West Africa.

The Leopard and the Serval of Africa are too well known to require any observation, except to remark that the Serval is by no means so variable in the form and disposition of the spots as the Leopard.

14. *Felis rutila*.

B.M.

*Felis rutila*, *Waterhouse, P. Z. S.* 1842, p. 130; *Gray, P. Z. S.* 1867, pp. 272, 394.

Red-brown, with indistinct darker spots on the back; belly white

with large brown spots; tail moderate, nearly half the length of the body, red-brown, with a dark central line down the upper surface, paler with obscure indications of bands on the sides.

*Hab.* Sierra Leone. Type and two other specimens in British Museum.

The skull of this species is in the British Museum. It is oblong; the orbit rather large, incomplete behind; the intermaxillary produced and extending halfway up the side of the nasal; the upper front false grinder very small. Length  $4\frac{3}{4}$ , width  $3\frac{1}{8}$  inches. Very like that of *F. serval*, but smaller.

#### 15. *Felis neglecta*.

B.M.

*Felis neglecta*, *Gray, Ann. & Mag. N. H.* 1838, i. p. 27; *P. Z. S.* 1860, p. 246; 1867, pp. 272, 395.

Grey; head and body marked with numerous small darker spots, spots of the lower part of the sides rather larger; belly white, with large blackish spots; tail quite half the length of the body, with a dark line along the upper surface, sides paler, with obscure indications of darker bands.

*Hab.* Gambia (*Rendal*). The typical skin in British Museum.

#### 16. *Felis servalina*.

B.M.

Fur fulvous, beneath white, middle of the back darker, with very numerous small black spots, spots on sides rather larger, on the belly much larger; tail short, fulvous, with five or six imperfect black rings and a pale tip.

*Felis servalina*, *Ogilby, P. Z. S.* 1839, p. 4; *Gray, P. Z. S.* 1867, p. 395 (not *Gray, P. Z. S.* 1867, p. 401).

*Hab.* Sierra Leone. Three skins in British Museum.

#### 17. *Felis celidogaster*.

*Felis celidogaster*, *Temm. Monogr.* i. p. 140; *Esquiss. Zool.* p. 87 (not *Gray*); *Gray, P. Z. S.* 1867, pp. 272, 395.

*Felis chalybeata*, *H. Smith* (not good).

*Hab.* Guinea (*Mus. Leyden*).

Temminck has described a Cat purchased at the sale of Bullock's Museum in Piccadilly under the name of *Felis celidogaster* (*Monogr. Mamm.* i. 140), stating that he believes that it inhabits Chili or Peru (more lately it has been believed that it might be an Indian Cat—the *Felis viverrina* of Bennett, for example); but no Cat of the kind is known in those countries. In his 'Esquisses' he has redescribed the species from a specimen received from Guinea. The following is a translation of his description:—

"*FELIS CELIDOGASTER*, *Temm. Monogr.* i. 140; *Esquisses Zool.* 87.

"*Felis chalybeata*, *H. Smith, Griffith, A. K.* ii. t. (not good).

"Tail rather shorter than half the length of the body and head. Length of body and head 26, tail 14 inches=3 feet 4 inches.



"Fur short, smooth, shiny, grey, with a reddish tint, with chocolate or light brown spots; spots on dorsal line oblong, the others round; cheek and lips whitish, with small brown spots; throat and chest with six or seven half-circular brown bands; lower parts and inner side of the limbs pure white, with large round chocolate-brown spots; two bands of this colour on the inner side of the fore, and four on the hind feet; tail bay brown, with paler brown rings, end black brown; outer surface of the ears black; claws white."

#### 18. *Felis senegalensis*.

*Felis senegalensis*, Lesson, *Guérin's Mag. Zool. Mamm.* t. 10; Gray, *P. Z. S.* 1867, pp. 272, 395.

*Hab.* Senegal.

Very like *F. viverrina* from India. Can it be the same?

Lesson, in the 'Magasin de Zoologie' for 1839 (Mammifères, t. 10), has figured and described a Cat under the name of *Felis senegalensis*, which is said to have been brought from the river Senegal. It is thus described:—" *Felis rufo-fulvoque-griseus, subtus rufescenti-albidus, auriculis latis intus albidis, supra nigerrimis cum lunula nivea; dorso et lateribus tribus vittis nigris nec non lineis formatis e numerosissimis maculis atris; cauda longa, rufescenti-grisea, nigro maculata; facie rufa, duabus lineis et naso aterrimis; rostro albo; pedibus rufo-griseo punctatis.*" The description and the figure do not agree with any of the three Cats from Africa in the British Museum.

The *Felis neglecta*, like the Serval, has no dark streak on the cheek, which is so generally found in Cats. In Lesson's figure only one throat-streak (the upper one in most other Cats) is marked, the second streak mentioned in the description being from the side of the forehead to the end of the nose. The tail in Lesson's figure is longer in proportion to the body than the tail of the Serval, or of any of the three African Cats here described; and the belly is not white, as it is in all of them and in *F. celidogaster* of Temminck. In some respects the Cat agrees with *Felis viverrina* of Bennett from India (can there be any mistake in the African habitat?); but the streaks on the side of the face are different from those of that Cat, which has two in the usual situation; indeed the streak in Lesson's figure is so unlike the streak in any Cat that I have seen that I almost doubt whether the artist has correctly represented it as going from the orbit to the middle of the front edge of the ear.

The Cats from the West Coast of Africa are very little known; and, fortunately, there are in the British Museum the type specimens on which three of the species have been founded, and of two of them other and better specimens of the skins than those first described have been received and are in the collection, showing the distinctness of the species, which were each described from a single imperfect skin.

The three very distinct species of Spotted Cats from West Africa, which have been described at different times by Mr. Waterhouse,

Mr. Ogilby, and myself, all differ from the one from Guinea described by M. Temminck. My *Felis neglecta* agrees with *F. celidogaster* in many particulars; but the spots are much smaller than M. Temminck describes, they are by no means of a chocolate or bright brown colour, and the tail is not ringed. These are just the characters by which the three skins in the British Museum are distinguished from each other. It is most probable that the *F. celidogaster* of Guinea is distinct from the Cats from the Gambia and Sierra Leone which are in the Museum. All the three, and, indeed, very many other Spotted Cats, have the belly distinctly spotted and the throat with a half collar; so that the name *F. celidogaster* would be equally applicable to any of them.—Gray, P. Z. S. 1867, p. 394.

++++ Small-sized spotted Asiatic Cats. Tiger Cats.

The smaller Spotted Cats of the warmer parts of Asia have all been regarded as one species by Mr. Blyth, following in the wake of Temminck; but it is to be observed that the latter naturalist only had the specimens from Java and Sumatra to examine. Perhaps if he had had in his museum specimens from Nepal, Bhootan, China, and the various districts of continental India, he would not have regarded them as belonging to the same species, as he did those from Java and Sumatra. They, no doubt, are very similar, and we know that the Spotted Cats, as the Leopard, the Jaguar, the Ocelots, and the Kuichua of Brazil are very variable; but then in a large series of these specimens the varieties pass into each other, and the countries where the different varieties come from are contiguous, and different varieties come from the same locality. Now that is not the case with the small Spotted Cats of India; and until we have a series sufficiently large to show how the species do pass into each other, I think it is safer to regard them as valid.

Of the small-sized Spotted Asiatic Cats, which have an ovate skull and incomplete orbits, there are several specimens in the Museum which appear to be worthy of being noticed either as species or well-marked varieties. They all have two well-marked streaks on each cheek; and there is a pale or white streak up each side of the forehead, and one between the cheek-streaks.

To this group belong *Felis sumatrana* and *Felis javanensis* of Horsfield, Zool. Java; *Felis nepalensis*, Vigors and Horsfield, Zool. Journ. iv. t. 39; and *Felis chinensis*, Gray, Mag. N. H. 1837, from China, and some others undescribed.

19. *Felis minuta*.

B.M.

*Felis minuta* (part.), Temm.; Gray, P. Z. S. 1867, pp. 273, 400.

*Felis undata* (part.), Fischer.

*Felis sumatrana*, Horsfield, Z. Java, t.

Hab. Sumatra.

20. *Felis javanensis*.

B.M.

*Felis javanensis*, Horsfield, Zool. Java, t. ?; Gray, P. Z. S. 1867, pp. 274, 400.



*Felis Diardii*, Griffith.  
*Felis minuta*, var., Temm.  
*Felis undata*, var., Fischer.

*Hab.* Java.

21. *Felis nepalensis*.

B.M.

*Felis nepalensis*, Vigors & Horsfield, *Zool. Journ.* iv. p. 382; Gray,  
*P. Z. S.* 1867, pp. 272, 400.

*Hab.* India.

Perhaps a hybrid or domesticated.

22. *Felis chinensis*.

B.M.

*Felis chinensis*, Gray, *Mag. N. H.* 1837; *P. Z. S.* 1867, pp. 274, 400.  
*Felis bengalensis*, var., Blyth, *P. Z. S.* 1863, p. 184.

*Hab.* China.

23. *Felis pardinoides*.

B.M.

Fur grey-brown, with large black grey-varied spots; chin and beneath white. Spots of vertebral line black; of withers large, oblong; of loins linear; of sides, shoulder, and rump large, roundish, varied with grey hairs in the centre, making them appear somewhat as if they were formed of a ring of smaller black spots; of thigh and fore legs black, small, and there confluent into cross bands. Tail with black rings. Length, body and head 19, tail 9 inches.

*Felis pardinoides*, Gray, *P. Z. S.* 1867, p. 400.

*Hab.* India (*Capt. Innes*; from Zool. Soc. Mus.).

Skull, length  $3\frac{1}{2}$ , width  $2\frac{1}{2}$  inches; orbits moderate, oblong; hinder nasal opening oblong, with an angular front edge.

24. *Felis pardochroa*. (Nepal Tiger.)

B.M.

Fulvous, with various-sized and -formed black spots and streaks.

Fig. 7.



*Felis pardochroa*.



Spots of the loins oblong, separate; throat, chin, and belly white, black-spotted. Tail irregularly and incompletely ringed.

*Felis pardochrous*, *Hodgson, Calc. Journ.* iv. p. 286; *Horsfield, P. Z. S.* 1856, p. 396; *Gray, P. Z. S.* 1867, p. 273. fig. 7, p. 400.

*Felis nepalensis*, *Hodgson, icon. ined.*

*Hab.* Nepal (*Hodgson*).

Length, body and head 25, tail 12 inches. Skull, length 3 inches 11 lines, width 2 inches 8 lines.

Pupil linear, erect.—*Hodgson*.

*Var.* Fur shorter, closer.

B.M.

*Hab.* Tenasserim (*Packman*).

## 25. *Felis tenasserimensis*.

B.M.

Fulvous, black-spotted; chin and beneath white. Spots of the body large, angular; of shoulder round; of thigh oblong; of the loins elongate, confluent; of the back of the neck elongate, double at the hinder part, and on the withers nearly enclosing a lanceolate brown disk.

*Felis tenasserimensis*, *Gray, P. Z. S.* 1867, p. 400.

*Hab.* India; Tenasserim (*Packman*).

Like *F. pardochroa*, but larger; spots of withers and loins very different.

## 26. *Felis Jerdoni*.

B.M.

Fur grey, with a few small distant black spots. Spots of sides and legs roundish; of central line of the back linear, rarely confluent. Tail and feet darker grey-brown, scarcely spotted; chin and beneath white, black-spotted.

*Felis Jerdoni*, *Blyth, P. Z. S.* 1863, p. 185 (not described); *Gray, P. Z. S.* 1867, pp. 274, 400.

*Leopardus sumatranus* (var. grey), *Gray, Cat. Mamm. B. M.* p. 43.

*Hab.* Indian peninsula: Madras. Adult in British Museum.

"Very like *F. bengalensis*, but smaller; the ground-colour of the upper part grey, untinged with fulvous" (*Blyth*). Size of *F. rubiginosa*. The "kitten" that Mr. Blyth refers to as being in the British Museum is a nearly full-grown specimen.

## 27. *Felis Herschellii*.

B.M.

Fulvous, black-spotted; streak on forehead and cheeks, chin, throat, and beneath yellowish white. Spots small, unequal-sized, far apart; of body oblong; of legs round; of loins elongate, sometimes confluent; of withers oblong.

*Chaus servalinus*, *Gray, Cat. Mamm. B. M.* p. 45 (excl. syn.).

*Felis servalina*, *Gray, P. Z. S.* 1867, p. 401 (not *Ogilby*).

*Hab.* India; "Zanzibar?"

Like *F. minuta*, but spots smaller and further apart.

28. *Felis wagati*. (The Wagati.)

B.M.

Fur fulvous; nose, chin, throat, and underside of body, and streak on forehead and cheek, pale yellow. Spots of body few, large, irregular-shaped; of withers large, elongate, broad; of loins elongate, narrow, more or less confluent. Tail with round spots.

*Felis wagati*, Elliot (fide Blyth); Gray, *P. Z. S.* 1867, p. 400.

*Hab.* India.

Differs from *F. pardochroa* and *F. minuta* in the large size of the spots.

++++ Clouded or marbled African Cats. Orbits of skull very large.

29. *Felis caligata*.

B.M.

Lynx, Bruce, *Voy.* viii. no. 30.

"*Felis caligata*, Bruce," Temm. *Monogr.* p. 123; I. Geoff. Jacq. *Voy.* t. 3. f. 1, 2 (skull).

? *Felis libycus*, Olivier, *Voy.* p. 41.

*Felis caffra*, Desm. *Suppl.* p. 540, 1822; Gray, *P. Z. S.* 1867, p. 273.

*Felis nigripes*, Burchell, *Travels*, 1822; Blainv. *Ostéogr.* f. 6.

*Felis maniculata*, Rüppell, *Zool. Atlas*, i. t. 19 (pale variety); Gray, *P. Z. S.* 1867, p. 274.

?? Chat aux oreilles rouges ou Chat botté (*F. caligata*), *F. Cuvier*, *Mamm. Lithogr.* t. (pale variety).

*Felis pulchella*, Gray, *Mag. N. H.* (very pale variety).

*Felis chaus*, Rüppell, *Atlas*, i. t. 140.

? *Chaus*, *F. Cuvier*, *Mamm. Lithogr.* t.

*Felis obscura*, Desm. *Mamm.* p. 250 (black variety).

The "Chat noir du Cap," *F. Cuvier*, *Mamm. Lithogr.*, and *F. caligata*, β, Fischer, *Synopsis*, p. 208 (from *F. Cuvier's* figure), is only a melanism.

*Felis dongolensis*, Hemph.

*Felis Rüppelli*, Brandt.

*Felis marginata*, Loch, *Rev. Zool.* 1858.

*Hab.* Africa, North, South, Central, and East.

*Var.* Hybrid with *F. domestica*.

Skull of *Felis caffra* 4 inches 5 lines long, 3 inches 2 lines wide.

Orbits subquadrangular,  $1\frac{1}{8}$  inch high, incomplete behind.

Skull of *Felis maniculata*  $3\frac{1}{2}$  inches long,  $2\frac{1}{2}$  inches wide. Face short, broad; orbits large, rather oblong, nearly complete behind.

This species varies from pale fulvous to grey, which is the *Felis maniculata* of Rüppell (*Zool. Atlas*, i. t. 140). There are several specimens of this species in the British Museum. The largest and darkest, being grey with darker bands, is a specimen from Tangiers, received from M. Verreaux, the body and head 24, and the tail 14 inches long; the darker bands are very indistinct. There is a second example, not quite so large, with bands darker, that lived several years in the Zoological Gardens, and was sent from Tunis by Sir Thomas Reade—and a smaller one, similar in colour, also from the Zoological Gardens, but without any special habitat attached, and a dark grey kitten from Kordofan.

Two other specimens are pale yellowish, slightly grizzled, with the



streak and spot of the body rather darker yellow, and the rings on the end of the tail are black. One of these, brought from Macassar by Mr. Wallace, is rather darker than the other, and has the bands on the legs nearly black, like the Tunisian specimen. The other, from Kordofan, is rather paler, and the bands on the legs, like those on the body, are yellow.

Very nearly allied to these, and probably only a variety, is a small nearly white Cat, marked with pale yellow stripes, sent from Egypt by Mr. Christie, which I described in the 'Magazine of Natural History' for 1837 under the name of *Felis pulchella*. It differs greatly from all the other specimens of *F. maniculata* in the very large size of the ears; but it resembles them so closely that I am almost inclined to believe that it may be only a very pale variety of that species. The size of the ears may have been produced by the negligence of the stuffer; but that can only be decided by the examination of fresh specimens. Mr. Blyth thinks that this specimen is only "an Egyptian variety of the Common Cat" (P. Z. S. 1863, p. 184, note); but I cannot agree with that theory.

The three large specimens in the British Museum of these Cats come from South Africa. The largest was received from M. Verreaux, the next largest from the Zoological Society's Museum under the name of *Felis caffra* (*Felis nigripes* of Burchell), the other from Dr. Andrew Smith as *Felis caffra*.

The first two of these are dark grey, with distinct dark, blackish bands and spots. Dr. Smith's specimen is much paler, yellow, with very indistinct rather darker yellow bands and spots, and very broad black bands on the legs.

The large specimens (*Felis marginata*) from Tunis and Tangiers are very like the largest dark one from the Cape.

A rather small specimen, received from Mr. Brandt of Hamburg as *F. caligata* from Africa, is only obscurely banded, is peculiar in the tail being black at the tip for about an inch, and in only having three or four very obscure narrow cross bands across the upper surface of the hinder two-thirds of the length of the tail.

A small specimen, very obscurely banded and having a redder fur with darker red streaks on the back, was received from Capt. Speke, marked "Menessá."

I suspect that what have been called the African *F. chaus* may be only pale varieties of *F. caligata*; at least I have not seen any specimens of the true *F. chaus* from Africa. M. F. Cuvier's figures of *F. chaus* from Egypt are doubtful; for he describes the body and head as being 2 feet 4 inches long, and the tail 9 inches long; but the figure represents the tail as two-fifths, while the description represents it as being only one-fourth of the entire length. In the same manner the *Chat aux oreilles rouges*, figured by M. F. Cuvier, Mamm. Lithogr., from a specimen from India, is said to measure 24 inches from the end of the nose to the base of the tail, and its tail to measure 10 inches; and in the figure the tail is very nearly half the length of the head and body. Can both or either of these figures represent *F. chaus*, which is known by its short tail?

The largest Cape specimen measures, body and head 30, tail 15 inches.

Most of the specimens of *Felis caligata* from Africa, like *Felis domesticata*, *F. indica*, and *F. torquata* and many other species, have the hinder part of the feet black; but this is not a permanent character; for some of the smaller paler specimens of *F. caligata* have the hind feet paler than the back of the animal, and some of these have the heels more or less brown or blackish on the outer edges.

+++++ *Smaller clouded Asiatic Cats.*

### 30. *Felis inconspicua*.

B.M.

*Leopardus inconspicuus*, Gray, 1844.

*Felis torquata* (Chat de Nepaul), *F. Cuvier*, *Mamm. Lithogr.* ii. t.

? *Felis bengalensis*, *Desm.* (from *F. Cuvier*?).

*Felis inconspicua*, Gray, *P. Z. S.* 1867, p. 273.

*Hab.* India (domesticated, or perhaps a hybrid).

Skull, length 3 inches 2 lines, width 2 inches 1 line.

Face moderate, broad, rather concave in front of orbits; orbits large, rather oblong, incomplete behind; forehead slightly convex, rhombic. Like skull of *Chaus libycus*, but smaller, and the forehead not so convex.

This Cat comes from India. There is a single specimen of it in the British Museum, which in the 'List of Mammalia,' published in 1842, I named the Waved Cat (*Leopardus inconspicuus*), p. 42, referring it to the *Felis torquata* (*Chat de Nepaul*, *F. Cuvier*, *Mamm. Lithogr.* ii. t.) with doubt, because the tail of that species is represented as of the same colour as the back, with a series of triangular spots forming half bands on the lower surface for the whole length, and there is only one streak (the upper one) on the cheek, while our specimen, like almost all the species of Cats, has two well-marked streaks. As no specimen like the figure has been received from India, I am now inclined to believe that it is intended to represent the Cat in the Museum, and that the differences are perhaps the errors of the artist. Indeed it is doubtful if the figure is not a copy of an Indian drawing, like several of the animals figured in that work, said to have been received from M. Duvaucel. I cannot agree with Mr. Blyth in thinking that *F. torquata* is the same as *F. ornata*.

Mr. Hodgson sent from Nepaul a very large specimen, which agrees with the typical specimen of *F. inconspicua* in its most essential characters, but is much larger, and the waved bands are more broken into spots; these spots are all nearly of the same form. The head and body of the stuffed specimen is 25 inches, and the tail 11 inches long. In the list of Mr. Hodgson's specimens he asks "Is it a tame Cat?" p. 6. Mr. Hodgson, in his MS. list, called it *Felis viverriceps*. There is a third, smaller specimen in the British Museum, received through Capt. Boys from India.

This Cat, like *F. caligata* of Africa, is peculiar in having the



body marked with transverse or, rather, perpendicular bands which are more or less broken into spots; and it has more marked, wider, and black bands across the upper part of the fore and hind legs. The tail, which is not quite so long as the body, is of the same colour as the back, and has some narrow black rings near the tip, which is black.

The *Felis inconspicua* of India and the *F. caligata* of Africa are nearly allied and very similar; but one is grey and the other more fulvous and rather differently marked—so much so that I think they are distinct. They and *Felis indica*, the “Domestic Cat of India,” differ from *Felis chaus* of India (and Africa?) in the greater length of the tail. The first two are almost always more or less distinctly banded and spotted, the *F. chaus* and *F. indica* being very obscurely (if at all) banded, except on the legs and thighs.

### 31. *Felis domestica*.

B.M.

*Felis domestica*, Brisson; *Blasius, Wirbelt. Eur.* p. 167. f. 104, 105 (skull); *Gray, P. Z. S.* 1867, p. 272.

*Felis syriaca*, *Aldrov.*

*Hab.* Syria?, and has been introduced as a domestic animal in most countries.

The normal colour seems to be that of the Tabby Cat, grey with black dorsal streaks and subconcentric bands on sides and thighs; sometimes all black from melanism, or grey, blue, yellow, or white, or these colours more or less mixed. When black, white, and yellow, it is called Tortoise-shell or Spanish Cat. The fur varies greatly in length; it is very short, close, and almost erect from the skin in the Rabbit Cats; it is very long, silky, and fluffy in the Angora (or Angola) Cat. The tail is usually long. It is very short or almost entirely wanting in the Isle-of-Man Cats, or the Japan Cats of Kämpfer. The ears are generally erect; but they are sometimes pendulous in the Chinese Cats.

Mr. Hodgson thinks the Domestic Cat (*Felis domestica*) is derived from *F. nepalensis* (*Journ. Asiat. Soc. Bengal*, i. p. 341). Pennant (*Hist. Quad.* i. p. 293) says the Indian Wild Cat breeds with the Domestic English one. The Domestic Cats in India breed with *F. chaus* and *rubiginosa*, Elliot, with *F. ornata*, Scott, and with *F. viverrina*, Kelaart, in Ceylon. They breed with *F. caffra*, Layard, at the Cape (see Blyth, *P. Z. S.* 1863, p. 184).

In the British Museum there is a specimen of *Felis domestica* that was collected, by Mr. Darwin, wild in the woods at Maldonado, mentioned in the ‘Voyage of the Beagle,’ *Mam.* p. 20. It shows how nearly the Domestic Cat is to the above species: it chiefly differs from *F. caligata* in the tail being more slender and tapering, the colours more intense and defined, and in the throat being pure white. It is dark grey, grizzled with black streaks and spots; the streaks on the legs are wide, those of the fore legs more or less confluent. The tail is grey for two-thirds of its length, with black rings, the hinder one being broadest; the hinder third of the tail is



black, with a small pure-white tip. The stripes on the loins are straight and parallel, not subspiral as in the Tabby Cats. The cheek-streaks are black, the lower one indistinct and interrupted. The toes are white.

32. *Felis manul*.

B.M.

*Felis manul*, Pallas; Gray, P. Z. S. 1867, p. 274.

*Felis nigripetctus*, Hodgson.

*Hab.* Tibet.

Pupil linear, erect.—Hodgson. Skull not observed.

The Manul (*Felis manul* of Pallas) was regarded as a new species by Mr. Hodgson under the name of *Felis nigropectus*, and is beautifully illustrated in the drawing of his Nepalese animal in the British Museum. In the British Museum also is a fine specimen of this Cat, presented by Mr. Hodgson, under the latter name. It has many characters in common with the other wild species of the restricted genus *Felis*; but it is at once known by its very long, soft hair, the pale whitish colour only varied by a slight black wash on the upper part of the legs and the black on the chest. Fischer, who only worked from books, considers it a variety of *Felis domestica*; but it is a very distinct and well-marked species.

## +++++ European Clouded Cats.

33. *Felis catus*.

B.M.

*Felis catus*, Linn.; Gray, P. Z. S. 1867, p. 274.

Chat sauvage, Buffon, H. N. vi. t. 1; Blasius, W. E. p. 163. f. 102, 103 (skull); Blainv. Ostéogr. t. 10 (skull).

*Hab.* Europe.

Tail very thick.

Skull, length  $3\frac{3}{4}$ , width  $2\frac{3}{4}$  inches. Orbits nearly complete, 1 inch in diameter.

The Wild Cat of Europe (*Felis catus*) is distinct from the African and Asiatic species of the restricted genus *Felis* in the British Museum. It is at once known by its thick cylindrical truncated tail; but it is so well known, and has been so often described, that I need not add any further observations respecting it. It is said that it breeds with the Domestic Cat, and that the skull of the hybrid, as well as the coloration of the fur, is more or less modified by the interbreeding.

34. *Felia megalotis*.

*Felis megalotis*, Müller; Gray, P. Z. S. 1867, p. 274.

*Hab.* Timor. Not seen by me.

## 11. CHAUS.

Tail shorter than the body, reaching to the hocks. Ears pencilled at the tip. Pupil oblong, erect. Skull—face short; forehead of

skull convex; orbits very large, incomplete behind; nasal bones narrow, close on the maxilla; front upper false grinder distinct; upper tubercular grinder small, transverse; the lobe on the inner side of the upper flesh-tooth moderate.

Of the genus *Chaus* (as defined by the shortness of the tail), which appears to be confined to Asia, there are what I am inclined to regard as three distinct species in the Museum Collection.

### 1. *Chaus Jacquemontii*.

B.M.

*Felis chaus*, *Güldenst.*?

*Felis Jacquemontii*, *I. Geoff. Voy. Jacquemont*, t. 3. f. 1, 2 (skull).

*Chaus Jacquemontii*, *Gerrard, Cat. Bones B. M.*

*Chaus libycus*, *Gray, P. Z. S.* 1867, p. 275.

*Hab.* Africa and Asia.

In the British Museum there are two small specimens of *Chaus* with short tails from India which have more distinct dark bands across their body and legs, and which are without doubt the Cats that M. F. Cuvier and Blyth have confounded with the longer-tailed *Felis maniculata* of Africa.

This Cat was figured, from a specimen then alive in Exeter Change, under the name of the Bangalore Cat (*F. chaus*), in my 'Spicilegia Zoologica,' t. 2. f. 1. It is probably the *Felis Jacquemontii* of M. Isidore Geoffroy, in the 'Zoology to Jacquemont's Voyage,' the skull of which is figured t. 3. f. 1. Unfortunately the specimens in the Museum are few in number, and not in a very perfect state; but I can scarcely think that this Cat can be the young state of *Felis affinis* from Nepal. It is doubtless the Cat that Mr. Blyth confounds with the Egyptian Cat (*F. chaus*, Geoff.), stating that it is "the common animal of Bengal" (see *P. Z. S.* 1863, p. 186), and that, as in the case of many common animals, its skins are rarely brought to Europe. It seems spread over various parts of India, as the specimens in the British Museum were sent from the Matoralla territory by Sir Walter Elliot, and from Gangootra.

Having confidence in the declaration of M. F. Cuvier, that the skins he had received from Malabar were exactly like those of the animal named by M. Geoffroy in the Museum Catalogue *F. chaus* which came from Egypt, and with those that M. F. Cuvier figured and described under the same name that were received from North Africa, and also in Mr. Edward Blyth's observation (see *P. Z. S.* 1863, p. 181), that "the Egyptian specimen (of *F. chaus*) now living in the Society's Gardens is absolutely similar to the common animal of Bengal," I was misled and adopted their conclusion.

These authors must have examined their specimens very cursorily, and cannot have paid any attention to the length of the tail and the distribution of the bands when present. It will be seen by my preceding observations, founded on the examination of the specimens in the British Museum received from all parts of Africa (from Tunis and Egypt in the north, Abyssinia in the east, and the Cape of Good Hope in the south), that these Cats are all of one species, and of a



species easily distinguished from the *Chaus* of Asia by the greater length and development of the tail.

Mr. Blyth has kindly given to the British Museum a specimen of the Domestic Cat of India, which is generally distributed there. It agrees with *Felis chaus* in almost every character, but it is smaller in size. The tail is rather longer compared with the length of the body, has more narrow black rings, occupying full half of the length of the tail, and there are two narrow pale cheek-streaks.

In the Museum there are two larger and rather darker specimens, agreeing in almost every particular with the above. They are most likely hybrids between *F. chaus* and *F. domestica*. The Wild *F. chaus* is peculiar for having the cheek-stripes very indistinctly marked, or one or both entirely wanting.

## 2. *Chaus ornatus*.

B.M.

Fur short, pale whitish brown, black-spotted. Spots small; on the middle of the back smaller, linear; on the front part of the sides larger, oblong; on the hinder part of the sides small, round; on the thighs and upper part of the legs confluent, forming interrupted cross bands. Tail reaching rather below the heel, pale at the lower half, with some interrupted black rings at the end, which is whiter than the rest of the tail, the tip black. Crown with lines of small spots; cheeks with two narrow dark lines; chin, throat, and spot over the orbits whitish; belly with black spots like those on the side. Body and head 19, tail 8 inches.

*Felis ornata*, Gray, *Illust. Ind. Zool. t.*; *P. Z. S.* 1867, p. 401.

? *Felis Huttonii*, Blyth, *M.S.*

*Chaus ornatus*, Gray, *P. Z. S.* 1867, p. 275.

*Hab.* India (*Capt. Boys*).

Legs long and slender. Skull, adult, imperfect behind. Animal very different from *Felis torquata*, F. Cuvier. The skull sent from the Salt-range by Mr. Oldham and marked *F. Huttonii*, Blyth. Length 3 inches 10 lines, width 2 inches 7 lines. Orbits moderate, incomplete behind, 1 inch in diameter; crown convex, shelving on the sides; face rather short, broad; nasal very long, slender.

The orbits are much larger than in a skull of *F. himalayana*, of a larger size.

This Cat is at once known from all the other Indian species by the length and slenderness of the tail, and the small size and equal distribution of the spots. In this respect it resembles the Hunting Leopard; but the band on the legs, the shortness of the tail, and the terminal half of the tail being ringed at once distinguish it from that Cat and all the other species. The tail is somewhat like that of *F. chaus*.

This rather short-tailed Indian Cat has not been well understood. It has been most oddly mixed up by Mr. Blyth and others with *Felis torquata* (the *Chat de Nepaul* of F. Cuvier, *Mamm. Lithog. livr. ii.* 54), also named *Felis bengalensis* by Desmarest in the Supplement to his 'Mammalia,' which is a grey-waved Cat, nearly

like the English Domestic Cat, and is probably a half-bred Domestic Cat of India, as is said to be the case with the *F. nepalensis* of Vigors and Horsfield (Zool. Journ. iv. t. 39), which resembles this figure in some respects.

As the wild Indian species has not been characterized, I here describe the specimen in the Museum:—

This *Chaus* is the beautiful animal that I figured in the 'Illustrations of Indian Zoology' as *Felis ornata*. The small specimen of the species in the British Museum is not in a very good state. *Chaus ornatus* is of a pale, more or less bright, yellow-brown colour, with transverse bands of nearly uniform-sized roundish blackish spots on the body. The spots are larger, darker, and closer together on the thighs and upper parts of the legs. The tail has some black rings near the end, and a small black tip.

*Hab.* Northern India (*Capt. Boys*).

This does not appear to be a common Cat in India, as we have only received a single half-grown example, which was purchased at the sale of Capt. Boys's specimens; and I do not find it described in any systematic work, nor do I recollect to have seen any specimens of it in continental collections.

In his crude paper on the Asiatic species of the genus *Felis* (P. Z. S. 1863, p. 185), Mr. Blyth places *Felis ornata* under *Felis torquata*, observing that the figure is "very bad." If he had compared the specimen in the British Museum with the figure, he must have reversed this note; for it is very characteristic, but is taken from a larger and brighter specimen. Mr. Blyth, when he saw the specimen in the Museum collection, in his usual offhand manner, said it is only one of the numerous varieties of the common Indian Cat. This species is quite distinct from the Cat that Sir William Jardine afterwards figured as *Felis ornata* in the 'Naturalist's Library,' *Felidæ*, t. 28.

### 3. *Chaus catolynx*.

B.M.

*Felis catolynx*, *Pallas, Zoogr. Rosso-Asiat.* t.

*Felis affinis*, *Gray, Illust. Ind. Zool.* t.

? *Felis kutas*, *Pearson.*

*Lyncus erythrotis*, *Hodgson, Nep.*

It is known by the bright yellow colour of the fur, without any, or with only very indistinct, indications of darker streaks across the body, which, when present, are only to be seen when the body is looked at at certain angles.

This is the largest species. I figured it in the 'Illustrations of Indian Zoology' under the name of *Felis affinis*, having convinced myself that it was a distinct species years ago, when I was studying the animals of India from the Hardwicke Collection of Drawings. I have little doubt that this is the Cat described and figured by Pallas in the 'Zoographia Rosso-Asiatica,' t. 2, under the name of *Felis catolynx*. It is certainly the *Lyncus erythrotis* of Hodgson, whose drawings for his 'Nepal Fauna' contain several good figures of it. It may be the *Felis kutas* of Pearson. It inha-



bits, according to Mr. Hodgson, the central and lower regions of Nepal. There is a well-stuffed adult specimen of this Cat in the British Museum; it is a magnificent animal.

Güldenstädt's description and figure of the *Felis chaus* from the shores of the Caspian (Nov. Comm. Acad. Petrop. xx. p. 483, t. 14) agree with this animal in most particulars, and represent the short tail of the genus *Chaus*, the tail being rather more than one-fourth of the entire length of the body, or one-third of the length of the body and head (30 + 11 in.). The fur is described as "fusco-lutescens, gulæ et regionis umbilicalis albidus; pectoris et abdominis dilute rufescens." In the figure the underpart is represented as much paler than this description justifies, or than may have been intended. Otherwise it is a good representative of the Nepal animal. I have not seen any specimen from the Caspian. The red ear is common to the Nepal *F. affinis* and most specimens of *F. caligata* from Africa.

## Tribe II. Lynxes—LYNCINA.

Head short, subglobular. Legs elongate, the hind ones longest. Tail short, or very short. Ears pencilled at the tip. Pupils of eyes oblong. The face of the skull short; the lateral processes of the intermaxillæ and the frontal bones elongate, nearly reaching each other, and separating the nasals from the maxillæ. The orbits incomplete, large; the lobes on the inner side of the upper flesh-tooth moderate-sized.

### 12. LYNCS.

Tail very short. Limbs elongate.

\* Pads of feet overgrown with hair. Animal large. Lynx.

#### 1. *Lyncus borealis*.

B.M.

*Felis lynx*, Blainv. *Ostéog. Felis*, t. 3 (skull); *Blasius*, *W. E.* p. 173, f. 106 (skull).

*Lyncus borealis*, Gray, *P. Z. S.* 1867, p. 275.

*Hab.* Northern Europe and Asia.

#### 2. *Lyncus lupulinus*.

B.M.

*Felis lupulina*, Thunb.

*Lyncus lupulinus*, Gray, *P. Z. S.* 1867, p. 276.

*Hab.* Northern Europe; Sweden.

#### 3. *Lyncus canadensis*.

B.M.

*Felis canadensis*, Geoffr.

*Lyncus canadensis*, Gray, *P. Z. S.* 1867, p. 278.

*Hab.* North America.



**\*\* Soles of the feet nakedish. Animal small. Cervaria.**

**4. *Lyncus pardinus*. B.M.**

*Felis pardina*, Temm.

*Lyncus pardinus*, Gray, *P. Z. S.* 1867, p. 277.

*Hab.* Southern Europe and Turkey.

**5. *Lyncus isabellinus*. B.M.**

*Felis isabellina*, Blyth.

*Felis lynx*, Hodgson.

*Lyncus isabellinus*, Gray, *P. Z. S.* 1867, p. 276.

*Hab.* Tibet.

Pupil linear, erect.—Hodgson.

**6. *Lyncus fasciatus*. B.M.**

*Felis fasciata*, Harlan.

*Lyncus fasciatus*, Gray, *P. Z. S.* 1867, p. 276.

*Hab.* North America, western part.

**7. *Lyncus rufus*. B.M.**

*Felis rufa*, *Güldenst. Voy. de la Venus*, t. 9. f. 2-4 (skull).

*Lyncus rufus*, Gray, *P. Z. S.* 1867, p. 276.

*Hab.* North America.

**8. *Lyncus maculatus*. B.M.**

*Felis maculata*, *Vigors & Horsfield; Baird, Mamm. N. A.* t. 75 (skull of adult and young).

*Lyncus maculatus*, Gray, *P. Z. S.* 1867, p. 276.

*Hab.* North America : Mexico ; California.

**13. CARACAL.**

Tail cylindrical, reaching to the hocks. Limbs more equal. Pads of feet bald. Pupil oblong. The skull is that of the Lynx ; but the processes of the frontals and intermaxillæ are not quite so much produced, and they do not entirely separate the nasals from the maxillæ. The front upper false grinder is absent. The orbits are rather large, and incomplete behind. The lobe on the inner side of the upper flesh-tooth small.

*Caracal*, Gray, *P. Z. S.* 1867, p. 277.

***Caracal melanotis*. B.M.**

*Felis caracal*, Schreb. ; *Blainv. Ostéogr. Felis*, t. 10 ; *Van der Hoeven, Zool.* t. 19. f. 2 (skull).

*Caracal melanotis*, Gray, *P. Z. S.* 1867, p. 277.

*Hab.* Southern Asia and Africa ; Persia and Arabia.

## Fam. 2. GUEPARDIDÆ.

Head short, subglobular; face very short. Neck slightly maned. Legs elongate, slender, subequal. Tail elongate. Ears rounded. Pupil round? Skull—face very short, convex; the processes of the frontals and intermaxillæ very short, not separating the nasals from the maxillæ; the flesh-tooth of the upper jaw compressed, without any lobe, but with only a very slightly marked keel on the front part of the inner side; the front upper false grinder distinct, small; orbits incomplete, moderate. Tubercular grinders one on each side of the upper jaw.

The form of the flesh-tooth of the Hunting Leopard (*Gueparda*) at once separates it from all the Cats as distinctly as its long slender legs and round face. The flesh-tooth of the upper jaw, instead of being stout and having a more or less large but always distinctly marked prominence with a conical crown on the front of the inner edge, as is common to the skulls of all the Cats and Lynxes, in the *Gueparda*, on the contrary, is thin, compressed longitudinally, and has only a very slightly raised scarcely visible keeled ridge on that part. This process is represented as rather more prominent in M. de Blainville's figure of the skull (*Ostéographie, Felis*, t. 9) than it is in the specimens in the British Museum.

*Guepardinæ*, Gray, *P. Z. S.* 1867, p. 277.

Abnormal Cat, Gray, *P. Z. S.* 1867, p. 277.

## GUEPARDA.

*Gueparda*, Gray, 1840; *P. Z. S.* 1867, p. 277.

*Cynælurus*, Wagner.

*Gueparda guttata*.

B.M.

*Felis guttata*, Herm.; Blainv. *Ostéogr.* *Felis*, t. 4 (skeleton), t. 9 (skull).

*Felis jubata*, Schreb.

*Felis venatica*, A. Smith.

*Felis Fearonis*, A. Smith.

*Cynælurus Scemmeringii*, Rüppell.

*Junior*. *Gueparda guttata*, Gray, *P. Z. S.* 1867, p. 396, t. 24.

*Hab.* Africa and Asia; Persia; Cape of Good Hope.

The young Hunting Leopard (*Gueparda guttata*) I do not recollect to have seen described. It is covered with long soft hair, of a dark blackish-brown colour, on the limbs, sides, and beneath, and very obscurely spotted; the head, back of the neck, the back, and

the upper surface of the tail are pale brown; back of ears black; an angular line from the front of the orbit to the angle of the mouth dark brown; the lips, chin, and sides of the nose white (see P. Z. S. 1867, t. 24).

### Fam. 3. CRYPTOPROCTIDÆ.

Head oblong; face slightly produced; nose flat and bald beneath, with a central longitudinal groove. Legs moderate, nearly of equal length. Soles of the feet with six pads; fore ones wider in front; hinder ones oblong, elongate. The skull oblong; false grinders  $\frac{2}{3} \cdot \frac{2}{3}$ , the front upper small; tubercular grinders one only on each side of the upper jaw, none in the lower one; flesh-tooth with a well-marked internal lobe.

Viverridæ (Cryptoproctina), *Gray*, P. Z. S. 1864, p. 545.

#### CRYPTOPROCTA.

Head conical. Whiskers rigid, very long. Ears large, covered with short hairs externally. Nose naked, with a central longitudinal groove beneath. Tail elongate. Pads of the feet naked. Toes united by a web.

*Cryptoprocta*, *Bennett*, P. Z. S. 1832, p. 46; *Trans. Zool. Soc.* i. p. 137; *Gray*, P. Z. S. 1864, p. 545.

The *Cryptoprocta* "has an anal pouch, and when violently enraged it emits a most disagreeable smell, very like that of *Mephites*; when at liberty it lies constantly in a rolling position, sleeping always on its side or even on its back, holding with its fore feet the small wires of its cage."—*Telfair*.

M. Isidore Geoffroy, in his observations on this genus (*Mag. Zool.* 1839, p. 25), says it is very different from *Galidia*—which no one can doubt if he has studied the description of the feet. M. Jourdan observes, "Le *Cryptoprocta* de Bennett, peut être le même que l'*Eupleres* de M. Doyer; il semble plutôt être le représentant des *Paradoxures* de Madagascar" (*Ann. Sci. Nat.* vii. p. 272: 1837). This is a mistake, as any one may prove by comparing the skulls, which are both figured in De Blainville's 'Ostéographie.' M. Pucheran also appears to think that this animal and the one described as *Eupleres Goudotii* may not be different (*Rev. et Mag. Zool.* 1858, p. 40).

In my Monograph of Viverridæ I formed the genus into a distinct tribe of that family (see P. Z. S. 1864, p. 545), observing that the teeth of the young skull, which only was known, were somewhat like those of *Viverra malaccensis*; but the discovery of the adult animal has shown that it is very much like a Cat, but differing in



having bald soles to the hind feet and an additional false grinder on each side of each jaw.

**Cryptoprocta ferox.**

B.M.

*Cryptoprocta ferox*, Adolph. M.-Edw. & Alf. Grandidier, *Ann. Sci. Nat.* 1868, t. 1-4; Schlegel & Pollen, *Faune de Madagascar*, ii. p. 13, t. 8.

*Junior*. *Cryptoprocta ferox*, Bennett, *P. Z. S.* 1833, p. 46; *Trans. Zool. Soc.* i. p. 137, t. 14; Blainv. *Ostéogr.* pp. 15, 96, t. 6 & 12; Gray, *P. Z. S.* 1864, p. 546.

*Cryptoprocta typicus*, A. Smith, *S. African Quart. Journ.* ii. p. 134.

*Hab.* Madagascar (*Charles Telfair*).

\* Head elongate. Tubercular grinders in the upper and lower jaws.

**Fam. 4. VIVERRIDÆ.**

Head elongate. Nose simple, flat and bald beneath, with a central longitudinal groove. Feet broad. Toes short, curved, arched, covered with abundant close-spreading hairs, more or less webbed. Claws short and retractile into a sheath. Tubercular grinders two on each side of the upper and one on each side of the lower jaw. The fur soft, elastic, except in the anomalous genus *Arctitis*, which has a very harsh fur and a prehensile tail.

The *Viverridæ* include a considerable number of the middle-sized and small Carnivora. They are all natives of the Old World—that is to say, Africa and Asia (one of the species spreading itself over some of the southern parts of Europe).

The greater number of the species are found in Africa, and several are confined to Madagascar; others are inhabitants of various parts of Asia. Some species of the genera, as here revised, come from Africa, and others from Asia; but I do not know of any species but *Viverricula malaccensis* which is common to the two sections of the Old World.

The essential character of the *Viverridæ* is to have two tubercular grinders on each side of the upper jaw, and one on each side of the lower. In the genera *Linsang* and *Poiana* the hinder upper tubercular grinder is absent, and the teeth agree in number with those of the genus *Felis*; but the shape of the skull and teeth show that they belong to this family. There are generally three false grinders before the flesh-tooth; but in some genera the front one, which is often very small, is entirely wanting, or sometimes falls out early.

Mr. Waterhouse, in the 'Proceedings of the Zoological Society' for 1839, in a paper "On the Dentition of Carnivora," observes, "The *Viverridæ* have the same form of skull as the *Canidæ*, but differ in having the posterior portion more produced; the long palate is carried further back, and the small back molar, observable in the lower jaw of the Dog, is here wanting. They have, therefore, but one true molar on either side of the lower jaw, and two true molars on each side of the upper jaw." The form of the palate here relied on is not found in all the genera of the family, and sometimes varies in genera which are very nearly allied both in external characters and dentition.

The Hyæna Mr. Waterhouse was inclined to regard as an aberrant form of Viverridæ. Its carnassier has a large inner lobe, and in this respect also resembles the Viverra's and not the Cat's.

(See also some observations by me on the change of the teeth, &c., in some of the genera, in a paper in the 'Proceedings of the Zoological Society' for 1832, pp. 32, 62.)

There can be no doubt that the skull affords very important characters, especially for the division of the species into groups or genera, and also for the distinction of the species; but no one can examine an extensive series of skulls, even of animals obtained from the same locality, without being struck with the variation the skull presents during the growth and age of the animal, and also the variation which the specimens of the same age present, showing that the skull and the teeth are quite as liable to vary in form in each species (within certain limits, these limits being different in the various species) as any other part of the animal; so that a species cannot be said to be firmly established until the external form, the bones, and the habit of the species have been carefully studied, distinctly showing that the labours of the palæontologist in a zoological point of view are very unsatisfactory, from the necessary want of material for forming a reliable determination of species.

The late Mr. Turner made some very interesting observations on the base of the crania of the Carnivora, with a new distribution of the genera (see Proc. Zool. Soc. 1848, p. 63). It is to be regretted that he died so young, and could not continue his researches; for I have no doubt he would have thrown great light on the structure of the skulls of this group, as he always followed my studies like a shadow. Thus when I published my "Arrangement of the Hollow-horned Ruminants" in 1846 (Ann. N. H. xviii. p. 277), he shortly after read his paper on their skulls (see Proc. Zool. Soc. 1850, p. 164); when I commenced the study of the species of Edentata by a monograph of *Bradypus* in Proc. Zool. Soc. 1849, p. 65, he read his paper on the skull of Edentata in 1851. Being an observant and careful osteologist, he observed many particulars that a general zoologist would have overlooked; but this limitation of his study confined his views; so that he would not allow such genera as *Saiga*, *Pantholops*, or *Tamandua* (which have such striking external characters), because he did not observe such differences in the skulls as he considered of generic importance.



The impulse that Cuvier gave to zoology by the study of the skeletons and teeth of Mammalia, as shown in the 'Ossements Fossiles,' made such an impression on the succeeding students of zoology, that most of them, overlooking the importance that Cuvier himself attached to external characters, have confined themselves far too exclusively to the characters offered by these parts, overlooking the fact that bones and teeth are liable to vary like other parts of the animal, and that characters in the teeth that may be of great importance in most groups may be of comparatively little value in the others. Thus in the *Paradoxuri*, which every one must allow form a very natural group, well characterized by its habits as well as its external character, the skulls and the flesh-teeth offer such variations in form in the different species that they would be considered good generic characters in any other tribe of Viverridæ.

The notes on the skull and teeth in this work are always taken from those of the adult animal, unless it is stated to the contrary.

The Viverridæ have been divided into many genera, some only containing a single species, while one or two other genera have been left as magazines containing a number of heterogeneous species which had not been particularly examined. The characters of some of the published genera have not been made out on any uniform plan. Indeed that is the system of the day, to search out some animal which has some striking character, and to form it into a genus, leaving the greater number of species in the family under the old generic denomination, which, when examined with care, have quite as distinct characters. This is an evil which requires remedying; and I have tried to obviate it by submitting all the species of the group to the same kind of revision as M. Geoffroy submitted the old species when he rearranged the collection in the Jardin des Plantes more than half a century ago.

M. Temminck, in the 'Esquisses Zoologiques,' p. 100, has inquired if *Herpestes Widdringtonii* is a species or a local variety. He had never seen the animal; but this shows the spirit in which he seems always to have looked on the species described by others which were not in his museum. In the same work he gives a short *résumé* of the species of the genera *Herpestes* and *Paradoxurus*, and states that the catalogues are encumbered with many double and triple *emplois*, which must be erased from the systematic catalogue. After citing some examples of species which have been described nearly simultaneously by zoologists living in distant countries, as *H. urinator*, *H. paludosus*, *H. penicillatus*, and *Cynictis Steedmani* (which certainly are not instances deserving much blame, especially when we consider the many cases in which M. Temminck himself has described species in Holland which had been long previously described in England), he proceeds to propose to unite some species which are, in my opinion, perfectly distinct (some even belonging to different sections of the genus) according to characters that are almost universally adopted, and which he himself uses in other places. In the revision of the genus *Paradoxurus* in his monograph, and again in the above work, he has united together species which have not

the slightest relation to each other, and which he never could have united if he had seen authentic specimens of them. Thus he unites *P. Grayi*, *P. nipalensis*, and *P. laniger* to *P. larvatus*, and *P. Crossi* and *P. Pallasii* to *P. musanga*, regarding *P. bondar* as separate. Now if he had united *P. Grayi*, *P. nipalensis*, *P. laniger*, *P. Crossi*, and *P. bondar* together, he would have had the excuse that they all have some similarity of external appearance; and he might have been misled if he had only casually looked at them through the glass of the cases in the museum, as he looked at some specimens which he says he saw when in England. Synonyms cannot be determined by such an examination, nor is science advanced by such assertions.

*Synopsis of the Genera.*

A. Digitigrade. *The underside of the hind feet hairy, except the pads, metatarsus, and sometimes a small part of the tarsus. Upper flesh-tooth elongate; upper tubercular grinder small, transverse. Nose short; underside flat, with a central groove. Viverraceæ.*

I. *Body robust; tubercular grinders  $\frac{2}{1} . \frac{2}{1}$ ; back of tarsus hairy.*  
Viverrina.

1. VIVERRA. Legs moderate, equal. Head elongate. Tail conical, ringed. Back crested. Orbit of skull incomplete.
2. VIVERRICULA. Legs moderate, equal. Tail conical, ringed. Back not crested; heel with a small bald spot. Orbit of skull complete.

II. *Body robust; tubercular grinders  $\frac{2}{1} . \frac{2}{1}$ ; underside of the tarsus with a narrow naked streak. Genettina.*

3. GENETTA. Back with a black suberectile streak.
4. FOSSA. Back without any central streak.

III. *Body slender, elongate; tubercular grinders  $\frac{1}{1}$ . Prionodontina.*

5. LINSANG. Back of tarsus hairy.
6. POIANA. Back of tarsus with a narrow naked streak.

B. Subplantigrade. *The underside of the toes and more or less of the back of the tarsus naked, callous. Flesh-tooth strong, upper tubercular grinders large, broad. Nose short, underside flat, with a central groove.*

I. *The hinder part of the tarsus hairy to the palm; the tail bushy.*  
Galidiina.

7. GALIDIA.

II. *The upper part of the hinder part of the tarsus hairy; tail ringed.*  
Hemigalina.

8. HEMIGALEA.



III. *The hinder part of the tarsus bald, callous.*

a. *Tail thick, strong, prehensile.* Arctictidina.

9. ARCTICTIS.

b. *Tail very long, subconvolute; frenum naked, glandular; head elongate.*  
Paradoxurina.

10. NANDINIA. *Flesh-tooth elongate, triangular; tubercular teeth triangular, transverse. Orbit rather incomplete. Palate narrow, short.*

11. PARADOXURUS. *Flesh-tooth elongate, triangular; tubercular teeth oblong. Orbit very incomplete.*

12. PAGUMA. *Flesh-tooth short, triangular, large. Orbit very imperfect.*

13. ARCTOGALE. *Flesh-tooth triangular, small. Orbit nearly complete. Palate very narrow, elongate.*

The shortness of the characters that I give to some genera has been objected to by several writers, especially by amateurs who have not studied the Linnean brevity and method of description. They overlook the fact that the characters of the sections and subsections of the family that precede the genus form an essential part of the generic character, in the same manner that the section of the genus is part of the specific character of the species that the section contains. The definition of the subsections of the families and genera requires more study, analysis, and consideration than the writing out of a long generic character, that contains particulars that are common to a number of allied genera, such as the writers who make the complaint usually give. At the same time, the use of such detailed characters requires a greater exertion on the reader's part to eliminate the essential particulars, which are the real characters of the group. In the above table, the most easily seen and often empirical characters are purposely chosen, for facility of use and brevity. I have even used the colour of the animal for this purpose; for it has a great influence on the formation of a natural genus—more than many zoologists are willing to admit. Even those who know this fact avoid making use of it, apparently fearing that it might not be considered scientific! In the body of the essay, longer generic characters are given. Those who object to analytic characters forget the immense number of animals now known, and the great advantage of a rapid way of discovering the name of the animal they seek, and whose history they desire to know. As Mr. W. S. Macleay justly observes, "the modern art of describing is too long, often insufferably long, while human life remains as short as ever."—*Illust. Zool. South Africa*, p. 54.

Section A. Digitigrade. *The underside of the hind feet hairy, except the pads of the toes, the metatarsus, and sometimes a small part of the tarsus. The upper flesh-tooth elongate; upper tubercular small, transverse. Nose short, underside flat, with a central groove.*

### Tribe I. VIVERRINA.

The body robust. Tubercular teeth  $\frac{2}{1} \cdot \frac{2}{1}$ . The back of the hind feet hairy, except the pad of the toes and the metatarsus.

Viverrina, *Gray, P. Z. S.* 1864, p. 510.

There is a deep pouch for secreting civet, in the form of a deep cavity on each side of the anus (*P. Z. S.* 1832, p. 63).

#### 1. VIVERRA.

Head long; muzzle acute; pupil oblong, vertical (round, *Hodgson*). Neck with large black and white marblings. Body short, compressed; back black-crested; legs moderate, equal; tail moderate, tapering ringed. Toes 5/5; claws semiretractile. Teeth 40; false grinders  $\frac{3}{3} \cdot \frac{3}{3}$ .

Viverra, *Linn.; Gray, P. Z. S.* 1832, p. 63; 1864, p. 511.

*Hab.* Africa and Asia.

\* Tail black. African.

##### 1. Viverra civetta.

B.M.

Tail black; sides spotted.

Viverra civetta, *Schreb. Säugeth.* t. 111; *Bennett, Tower Menag.* p. 99, fig.; *Gray, P. Z. S.* 1864, p. 511.

Civette, *Buffon*, ix. p. 299, t. 34.

Var. ? Viverra Poortmanni, *Pucheran, Rev. et Mag. Zool.* vii. p. 154, 1853.

*Hab.* Africa: Abyssinia; Fernando Po (*Thompson*); Guinea (called "Kaukans") (*Temm.*); Gaboon (*Aubry Le Comte*).

\*\* Tail black-ringed. Asiatic.

##### 2. Viverra zibetha.

Tail black-ringed.

B.M.

Viverra zibetha, *Linn. S. N.* i. p. 65; *Gray, Illust. Ind. Zool.* ii. t. 5; *Proc. Zool. Soc.* 1832, p. 63; *Cat. Mamm. B. M.* p. 47; *P. Z. S.* 1864, p. 512; *Gerrard, Cat. Ost. B. M.* p. 71; *Schinz, Syn. Mamm.* i. 362; *Horsfield, Cat. Mus. India House*, p. 54.

Meles zibethica, *Linn. S. N.*

Viverra undulata, *Gray, Spic. Zool.* t. 8.

Viverra civettoides, *V. melanurus*, *V. orientalis*, *Hodgson, J. Asiatic Soc. Bengal*, x. 909.

Zibet, *Buffon*, ix. 299, t. 31.



*Hab.* Asia: Bengal (*Horsfield*); India (*Hardwick*); Calcutta (*Oldham*); Nepal (*Hodgson*); China (*J. Reeve*); Formosa (*Swinhoe*); ? Isle of Negros (*Cuming*) (skull B.M.); ? Malay peninsula (*Horsfield*).

Skull elongate, narrow. Nose compressed. Orbit incomplete behind. Teeth very like *Genetta*; upper hinder tubercular small, oblong, transverse, with two outer and one large inner tubercle. Lower jaw shelving in front; lower edge rather arched, without any tubercles below the end of the tooth-line; the tubercular grinders subcircular, with three lobes on the crown.

### 3. *Viverra tangalunga*.

B.M.

Tail black above, and ringed on the lower side.

*Viverra tangalunga*, *Gray*, *P. Z. S.* 1832, p. 63; 1864, p. 512; *Cat. Mamm. B. M.* p. 48; *Cantor, Mamm.*; *Horsfield, Cat. Mus. India House*, p. 57.

*Viverra zibetha*, *Raffles, Linn. Trans.* xiii. p. 231; *F. Cuvier, Mamm. Lithog.* t.

*Hab.* Sumatra (called "Tangalung") (*Raffles*); Borneo, Celebes, Amboyna (*Müller*); Malayan peninsula (*Cantor*).

What is *Viverra megaspila*, Blyth, *Journ. Asiat. Soc. Beng.* 1862, p. 321?

## 2. VIVERRICULA.

Head tapering. Throat with lunate dark bands. Body elongate; back not crested. Legs moderate, equal. Tail almost as long as the body, tapering, dark-ringed. Toes 5/5; claws acute, compressed. Pupil oblong, vertical. Teeth 40; false grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ ; flesh-tooth longer than broad in front, inner lobe on the front margin; tubercular grinders  $\frac{2}{2}$ .  $\frac{2}{2}$ .

*Viverricula*, *Hodgson, Journ. Asiat. Soc. Beng.* x. p. 909; *Gray, P. Z. S.* 1864, p. 513.

*Hab.* Asia.

Like a Genet, but with hairy soles to the feet, a shorter tail, and no crest. Foot with a small bald spot on the side of the palm-pad (see Hodgson, *J. A. S. B. t.* 31. f. 8).

### *Viverricula malaccensis*. (Malacca Weasel.) B.M.

Grey; back with seven black or dark streaks more or less broken up into spots: shoulders, sides, and legs spotted; feet deep brown and black; tail with seven or eight black rings.

*Viverricula malaccensis*, *Cantor, Cat. Mamm. Malay.* p. 29; *Gray, P. Z. S.* 1864, p. 513.

*Viverra malaccensis*, *Gmelin, S. N.* p. 92 (from *Sonn.*); *Gray, Cat. Mamm. B. M.* p. 48; *Gerrard, Cat. Ost. B. M.* p. 70.

*Viverra gunda*, *Hamilton Buchanan, Icon.*

*Viverra rasse*, *Horsf. Zool. Java*, t.; *P. Z. S.* ii. (1832) p. 23; *Schinz, Syn. Mamm.* i. p. 362.

- Viverra indica*, Geoff. MS.; Fischer, Syn. Mamm. p. 171; Desm. Mamm. p. 210; Gervais, Mag. Zool. 1835, p. 10, t. 19; Horsf. P. Z. S. ii. (1832) p. 23.  
 ? *Viverra bengalensis*, Gray, Illust. Ind. Zool. i. t. 4.  
*Viverra leveriana*, Shaw, Mus. Lever. t. 21.  
*Genetta manillensis*, Eydoux.  
*Genetta indica*, Lesson, Man. 174.  
*Genette rasse*, F. Cuvier, Mamm. Lithogr. t.  
*Civet de Malacca*, Sonnerat, Voy. ii. 144, t. 91.  
*Viverricula indica*, Hodgson, Journ. Asiat. Soc. Beng. x. p. 909.

Var. *Paler*, spots less distinct.

*Viverra pallida*, Gray, Proc. Zool. Soc. ii. p. 63; Illust. Ind. Zool. ii. t. 6; P. Z. S. 1864, p. 514.

Hab. Asia; Madras (Elliot); Gangootra, Nepal (Hodgson); Java (Horsfield); ? Comoro Islands (called "Tunga") (Peters).

Dr. Horsfield believed there were two species combined under this name (see Proc. Zool. Soc. ii. p. 23, 1832):—

*V. rasse*. Back with eight broad longitudinal lines; the three lateral lines on each side interrupted and obscure.

*V. indica*. Back with eight narrow longitudinal lines; the lateral lines continued.

I formerly thought that *V. pallida* from China, in which the spots and stripes are very indistinct, might be different; but a series of specimens from different localities seems to show a gradation from one to the other.

This species differs very much in colour from different localities and perhaps in different seasons. The stripes and spots are sometimes very black and distinct; at others, as in *V. pallida*, they are very indistinct, scarcely to be distinguished from the general colour of the fur.

The skull elongate, compressed; nose compressed. The orbit imperfect behind, confluent with the temporal fossæ. Grinders:—false  $\frac{3}{4}$ .  $\frac{3}{4}$ ; front upper small, compressed; the third rather thicker, without any internal lobe; the flesh-tooth trigonal, oblique, elongate, half as long again as the width on the front margin—the internal lobe trigonal, on the inner side of the front edge; the front tuberculars trigonal, outer side oblique; front edge rather wider than the length of the outer margin; the hinder tubercular subcircular, with three lobes. The lower jaw slender; lower edge slightly curved, without any prominence under the end of the tooth-line; the tubercular grinders subcircular, with three nearly equal lobes.

Length of skull  $3\frac{3}{4}$  inches; width of brain-case  $1\frac{1}{8}$  inch, at zygomatic arches  $1\frac{3}{8}$  inch.

I wrote to Dr. Peters to inquire if the *Tunga* of Anjuan could be the *V. fossa*, and if it was not a *Genetta*. He assures me that it agrees in all particulars with the Indian *V. rasse*, and, "like it, has no bald streak along the sole. It has a hairy sole to the hind feet, and a small callous spot to the pads of the palms towards the heel."—Letter, 24th Nov. 1864.



Dr. Peters considers the animal called the *Tunga* (which is common on the island of Anjuan, one of the Comoro Islands, near Madagascar, on the east coast of Africa) the same as the *Viverra rasse* of Dr. Horsfield; he says it agrees with it in colour, in the form of the ears, and in the bristly quality of its fur, and it has the soles of its feet covered with hair as in that animal. He also observes that the fauna of these islands agrees more with those of Madagascar and India than with that of continental Africa (see Peters, *Reise nach Mossamb.*, Mammalia, p. 113). If the animal is identical, it is the only species of the family I know common to Asia and Africa.

## Tribe II. GENETTINA.

The body robust; tubercular grinders  $\frac{2}{1} . \frac{2}{1}$ ; the underside of the tarsus of the hind feet with a narrow bald line extending from the pads nearly to the heel. The orbit of the skull is very imperfect, only contracted above. The fur is soft, spotted or cloudy, and the tail ringed.

### 3. GENETTA.

The body elongate; back with a broad, continued, more or less crested, black streak. Tail long, slender, hairy, ringed. Legs moderate. Feet hairy. Toes  $\frac{5}{5}$ ; the sole of the hind foot with a narrow longitudinal bald streak. Claws short, retractile. Skull elongate, narrow. Teeth 40; false grinders  $\frac{3}{1} . \frac{3}{1}$ ; flesh-tooth elongate; tubercular grinders  $\frac{2}{1} . \frac{2}{1}$ .

*Genetta*, Cuv. *Mamm. Lithogr.*

*Genetta*, Brisson, *R. A.* p. 252; *Gray*, *P. Z. S.* ii. (1832) p. 63; 1864, p. 515.

*Genettina*, *Gray*, *P. Z. S.* 1864, p. 515.

*Hab.* Africa and South Europe.

\* Tail tapering, with elongate, rather spreading hairs, and with numerous black and white rings; tip white.

### 1. *Genetta vulgaris*. (Genet.) B.M.

Blackish grey, black-spotted; tail elongate, with white and black rings of nearly equal length, the tip whitish; vertebral line black, suberistate; the fore legs and the feet grey, black-spotted; the hind legs black behind near the hock.

*Genetta vulgaris*, *Gray*, *P. Z. S.* ii. (1832) p. 63; 1864, p. 515.

*Viverra maculata*, *Gray*, *Zool. Misc.* p. 9, t. 9.

*Genetta afra*, *F. Cuv. Mamm. Lithogr.* t.

*Viverra genetta*, *Linn.*; *Fischer*, *Syn. Mamm.* p. 169.

*Genetta Bonapartei*, *Loche*, *Mag. Zool.* 1857, t. 18.

*Hab.* South Europe, North Africa, and Asia: in B. M., from Nîmes (*Verreaux*); Madrid, Algiers (*Loche*); Tangier (*Favier*); Barbary (*Gray*); Asia, Mount Carmel (*Tristram*).

The length of the rings varies in different specimens, depending on the length of the hairs of the tail. In some, two or more of the rings are more or less confluent, especially on the upper part and near the end of the tail.

I cannot find any difference between the specimens from Europe, Algiers, Tangier, and Mount Carmel. The distinctness and darkness of the streak upon the forehead differ in specimens from the same localities.

## 2. *Genetta felina*. (Feline Genet.) B.M.

Blackish grey, black-spotted; vertebral line black; tail elongate, white-and-black ringed, rings of nearly equal length; tip whitish; the outer side of the fore and hind legs black; feet blackish.

*Genetta felina*, Gray, *Proc. Zool. Soc.* ii. (1832) p. 63; 1864, p. 516.

*Viverra felina*, Thunb. *Sv. Akad.* xxxii. p. 166, t. 7.

*Genetta vulgaris*?, A. Smith, *S. Afr. Quart. Journ.* ii. p. 45.

*Hab.* South Africa: Cape of Good Hope (*Verreaux*) (the Muskat of the colonists); Latakoo, common (A. Smith).

The chief difference between this and *G. vulgaris* is that the legs and feet are blacker, the head is darker, with a more distinct black streak up the forehead between the eyes.

*Genetta rubiginosa*, Pucheran (*Rev. et Mag. de Zool.* vii. 1855, p. 154. "Griseo-albescens, fulvo lavata, maculis dorsalibus fere toto rubiginosis; cauda ad basim quatuor annulis rubiginosis, quatuor deinde nigris prædita.

"*Hab.* Cape of Good Hope"—J. *Verreaux*), is probably the same.

## 3. *Genetta senegalensis*. (Senegal Genet.) B.M.

Pale yellowish grey, brown-spotted; vertebral line black, sub-cristate behind; tail elongate, slender, yellow and black-ringed, the pale rings the longest; tip of tail pale; the hinder part of the hind legs blackish or dark brown.

*Genetta senegalensis*, Gray, *P. Z. S.* ii. (1832) p. 63; 1864, p. 516.

*Viverra senegalensis*, Fischer, *Syn.* p. 170 (from F. Cuv.).

*Genette de Sénégal*, F. Cuv. *Mamm. Lith.* t.

?*Genetta Aubryana*, Pucheran, *Rev. et Mag. de Zool.* vii. (1855) p. 154.

Fossane, Brown, *Illust.* t. 43.

*Hab.* West Africa: Senegal (*Verreaux*); ? Gaboon (*Aubry le Comte*); Sennaar (*Brit. Mus.* 46, 6, 15, 43). East Africa: Abyssinia (*B. M.* 44, 5, 17, 27); Dongola (*B. M.* 46, 9, 2, 27). North Africa (*B. M.* 43, 12, 28, 2).

Skull tapering in front; nose compressed. Orbit very large, very incomplete behind; the zygomatic arch confluent with the lower edge of the orbit, moderate. False grinders  $\frac{2}{4} \cdot \frac{3}{4}$ ; upper rather far apart, front small, second compressed, with a small lobe on each end; third compressed, with a small lobe on the middle of the inner side and one at the hinder end. The flesh-tooth triangular, much longer than the breadth at the front edge, with a moderate-sized



internal lobe rather behind the front inner angle. The tubercular grinders trigonal, with a sloping outer edge; the front twice as wide as long on the outer edge; the hinder small. The lower jaw slender, erect, with a shelving chin or short symphysis and a curved lower edge without any tubercles under the end of the tooth-line; the tubercular grinder roundish, with two large anterior lateral and a similar-sized posterior central lobe. Length of skull  $3\frac{1}{8}$  inches; width of braincase  $1\frac{1}{12}$ , at zygomata  $1\frac{5}{8}$ .

\*\* Tail subcylindrical, with shortish fur; end black, with imperfect rings; tip black; base with alternate, nearly equal black and white rings.

#### 4. *Genetta tigrina*. (Tigrine Genet.) B.M.

Grey-brown, with black spots, the larger more or less brown in the centre; the hind feet darker; the tail elongate, cylindrical, black, with rather broad white rings, but narrower than the black ones; tip of tail black.

*Genetta tigrina*, Gray, *Cat. Mamm. B. M.* p. 49; *P. Z. S.* 1864, p. 517.

*Viverra tigrina*, Schreb. *Säugeth.* t. 115.

*Genetta vulgaris*, Rüppell.

*Genetta amer*, Rüppell.

*Genetta abyssinica*, Rüppell, *Fauna Abyss.* t. 11.

*Viverra abyssinica*, Gerrard, *Cat. Bones B. M.* p. 71.

*Viverra genetta*, Peters, *Mossamb. Mamm.* p. 113.

*Hab.* South-Africa: Cape of Good Hope (the Musk-cat of the colonists); Natal and East Africa (*Verreaux*); Mozambique (*Peters, Kirk*); Abyssinia (*Rüppell*).

\*\*\* Tail subcylindrical, with shortish fur, black; middle part with some imperfect rings beneath, the base with a few narrow white rings.

#### 5. *Genetta pardina*. (The Berbe.) B.M.

Fur reddish grey-brown, with black spots more or less brown in the centre; the feet and hinder part of hind legs brown; tail elongate, covered with shortish hairs, with narrow pale or reddish rings on the basal half, black at the end, with very indistinct narrow pale rings.

*Genetta pardina*, *I. Geoff. Mag. Zool.* 1832, t. 8; Gray, *P. Z. S.* 1864, p. 518.

*Genetta pantharine*, F. Cuvier, *Mamm. Lithogr.* t.

*Genetta poënsis*, Waterhouse, *Proc. Zool. Soc.* 1838, p. 59 (from a flat skin).

*Viverra genetoides*, Temm. *Esq. Zool.* p. 89, 1853?

*Genetta Fieldiana*, Du Chaillu, *Proc. Boston N. H. Soc.* vii. (1860) p. 302 (from the Gaboon).

*Genetta servalina*, Pucheran, *Rev. et Mag. de Zool.* vii. (1855) p. 154. Berbe, Bosmann, *Voy. Guinea*, p. 31. f. 5; Buffon, *H. N.* xiii.

*Hab.* Fernando Po (*Waterhouse*); Guinea (*Temm.*); Gaboon (*Du Chaillu*); West Africa (*B.M.*); interior of Senegal (*I. Geoffroy*).

The specimens vary considerably in the size of the spots; in some

they are brown with black edge, in others almost uniformly black; but I can see no characters by which they can be separated.

*Genetta poënsis* seems to be the same variety as that described by I. Geoffroy and M. Du Chaillu.

#### 4. FOSSA.

The back without any black subcrested vertebral streak; the soles of the hind feet hairy, with ————?

Fossa, *Gray, P. Z. S.* 1864, p. 518.

#### Fossa Daubentonii.

Fossa Daubentonii, *Gray, P. Z. S.* 1864, p. 518.

Viverra fossa, *Schreb. Säugeth.* t. 114 (from *Buffon*).

Genetta fossa, *Gray, P. Z. S.* 1822.

Fossane, *Buffon, H. N.* xiii. p. 163, t. 21.

*Hab.* Madagascar (*Mus. Paris.*).

"Fur grey-black, rufous-varied, a white spot over the hinder angle of the eye; back and nape with black lines, four of which extend from the nape to the tail, continuous to the middle of the back, and the last of their length broken into very close spots; the sides, shoulders, and thighs with spots placed in three lines on each side; lips, chin, and beneath dirty white; tail with many narrow half-rings, of a reddish colour, which do not extend to the lower side; feet yellowish white. Length of body and head 17 inches, of tail  $8\frac{1}{2}$  inches. There are no subcaudal glands.

"*Hab.* Madagascar (*Poivre, Mus. Acad. Sci.* 1761)." — *Buffon*.

I do not know any other description of this species; that by all other authors, including Dr. A. Smith, is a mere copy of the above. There does not appear to be any central dorsal stripe, so characteristic of the Genets; the soles of the front feet have not been described.

### Tribe III. PRIONODONTINA.

Body slender, elongate; limbs very short; tubercular grinders  $\frac{1}{2}$ ; fur soft, close, erect; the tail very long, cylindrical, ringed.

#### 5. LINSANG.

Prionodon (subgenus of *Felis*), *Horsf. Java*; *Gray, P. Z. S.* 1864, p. 519.

Linsang, *Gray, Cat. Mamm. B. M.* p. 48; *Müller, Zoog. ind. Arch.*

Body very slender; back not crested. "Pupil linear, erect" (*Hodgson*). Legs short. Tail very long, cylindrical, dark-ringed. Toes 5/5. Claws very acute. Skull elongate. Teeth 38; false grinders  $\frac{3}{8}$ .  $\frac{3}{8}$ ; flesh-tooth elongate; tubercular grinders  $\frac{1}{2}$ .  $\frac{1}{2}$ .

*Hab.* Asia and Africa.

#### 1. Linsang gracilis. (Linsang.)

B.M.

Fur white; back with broad black cross bands; sides of neck with



a broad black streak continued along the sides of the body, confluent with the bands of the back; back of neck with five parallel black streaks. Tail with seven black and white streaks; a second streak, broken into spots, from the side of the neck to the haunches. Legs with small black spots.

- Linsang gracilis, Müller, *Zoog. ind. Arch.* i. p. 28, t.  
 Viverra? linsang, Hardw. Linn. Trans. xiii. p. 256, t. 24; De Blainv. *Ostéogr.* t. 12 (teeth).  
 Felis (Prionodon) gracilis, Horsf. *Zool. Java*, t.  
 Viverra Hardwickii, Lesson, *Man.* p. 172 (not Gray).  
 Viverra genetia, Deschamps, *MS. B. M.*  
 Paradoxurus prehensilis, Schinz, *Cuv. Thierr.* iv. p. 349.  
 Viverra gracilis, Desm. *Mamm.* p. 539.  
 Paradoxurus linsang, Fischer, *Syn. Mamm.* p. 159, 1829.  
 Prionodon gracilis, Gray, *P. Z. S.* 1864, p. 519.

*Hab.* Asia: Malacca?, Siam?, Sumatra?, Java? (Horsfield).

## 2. Linsang pardicolor. (Nepal Linsang.) B.M.

Pale whitish grey; back of neck and shoulders with three streaks diverging from the vertebral line; back with two series of large square spots; the shoulders, sides, and legs with round black spots; an elongated spot on the middle of the front part of the back, between the square spots on the sides of the body.

- Prionodon pardicolor, Hodgson, *Calcutta Journ. N. H.* ii. p. 37, t. 1.  
 f. 3 & 6, 1841; Gray, *P. Z. S.* 1864, p. 519.  
 Linsang pardicolor, Gray, *Cat. Mamm. B. M.* p. 49.  
 Viverra pardicator, Schinz, *Syn. Mamm.* i. p. 366 (misprint).

*Hab.* Nepal.

The skull elongate; nose rather short, compressed; brain-case narrow in front, swollen over the ears, and contracted and produced behind. Orbits not defined behind, confluent with the temporal cavity; zygomatic arch slender. Palate contracted behind. Teeth 38; upper false grinders compressed; flesh-tooth narrow, much longer than wide in front, the outer edge three-lobed, inner tubercle on the front edge; tubercular grinders transversely trigonal, much wider than long, the outer edge sloped, and the hinder lobes in the middle of the hinder edge. There is no hinder tubercular; but the one present is quite like the front tubercular in the typical Viverridæ.

The skulls of *L. gracilis* and *L. pardicolor* are very similar; but the skull is rather larger, the palate narrower in front and behind, and the bullæ of the ears are narrower and less ventricose in *L. gracilis* than in *L. pardicolor*.

The following are the measurements in inches and twelfths in *L. gracilis*:—length of skull  $1''\ 7'''$ , width at brain-case  $11'''$ , width of zygomatic arch  $1''\ 3\frac{1}{2}'''$ , length of nose  $9'''$ . *L. pardicolor*:—length of skull  $2''\ 6'''$ , width of brain-case  $10\frac{1}{2}'''$ , width of zygomatic arch  $1''\ 2\frac{1}{2}'''$ , length of nose  $8\frac{1}{2}'''$ .

## 6. POIANA.

Head small; ears rounded. Body slender, elongate; fur soft, close, short, nearly uniform in length, spotted; no central dark vertebral line. Legs rather short. Feet hairy, cat-like; toes 5/5, short; hind soles covered with hair; with a short narrow naked line, forked below, and only reaching to the middle of the foot above. Claws retractile. Tail cylindrical, black-ringed.

Poiana, *Gray, P. Z. S.* 1864, p. 520.

*Hab.* Africa.

Very like *Linsang* in external appearance, but with the feet of a *Genetta*.

**Poiana Richardsoni.** (Guinea Linsang.) B.M.

Pale brown, black-spotted; spots on the back larger, square; spots on sides and feet smaller, rounded.

*Linsang Richardsoni*, *Gerrard, Cat. Bones B. M.* p. 72.

*Viverra genetoides*, *Temm. Esq. Zool.* p. 89, 1853?

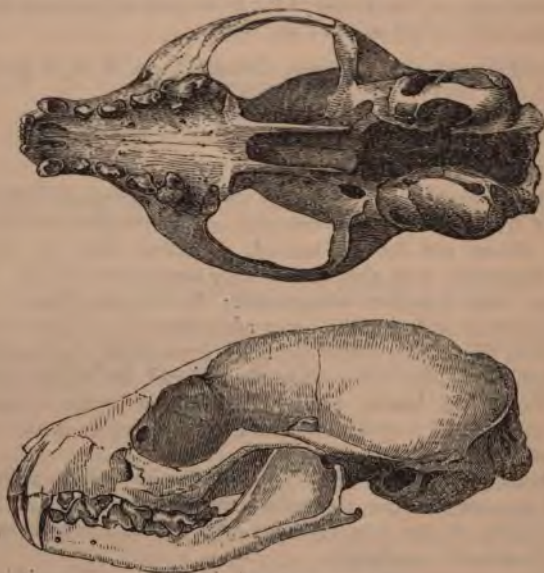
*Genetta Richardsoni*, *Thompson, Ann. N. H.* 1842.

*Genetta poënsis* (jun.), *Waterh. P. Z. S.* 1838, p. 59.

*Poiana Richardsoni*, *Gray, P. Z. S.* 1864, p. 520.

*Hab.* West Africa: Fernando Po (*Thompson*); Guinea (*Temm.*).

Fig. 8.



*Poiana Richardsoni.*

Skull and teeth very like *Linsang*; but the brain-case is ovate and more ventricose. The orbits not defined behind, and confluent with the temporal cavity; zygomatic arch stronger. The nose is



compressed. The palate is very narrow behind. Teeth 38; the upper false grinders compressed; the flesh-tooth considerably longer than broad in front, with a roundish inner lobe on the front edge, separated from the other lobe by a notch; the tubercular grinders transverse, triangular, broad, with a small lobe in the middle of the hinder edge. There is no second tubercular grinder in the upper jaw. Length of skull 2" 9", of nose 9"; width of brain-case 1 1/2", of zygomatic arch 1" 5".

Section B. Subplantigrade. *The underside of the toes and more or less of the back of the tarsus near the foot bald and callous. The flesh-tooth is massive and strong; the tubercular grinder large, broad.*—Gray, P. Z. S. 1864, p. 521.

### Tribe IV. GALIDIINA.

The hind part of the tarsus hairy to the sole; the tail bushy.

#### 7. GALIDIA.

Ears elongate. Body slender. Legs short. Tail elongate, cylindrical, rather larger at the end, ringed? Toes 5/5, arched, webbed; front subequal; the toes and sole bald; the tarsus hairy behind. Claws acute, compressed, retractile. Skull rather ventricose; face short; forehead arched; crown flat. Teeth 36 or 38; false grinders  $\frac{3}{3}$ , front very small; flesh-tooth triangular, elongate, longer than broad, and falls early; tubercular grinders  $\frac{2}{2}$ , transverse, the second very small (see skull, *G. elegans*, Geoff. Mag. de Zool. 1839, t. 17).

*Galidia*, I. Geoff. *Compt. Rendus*, 1837, p. 580; *Mag. de Zool.* 1839, pp. 27, 38, t. 14, 17; Gray, P. Z. S. 1864, p. 522.

We only possess *Galidia elegans*; and the feet of that species have no relation to those of an *Herpestes*, to which M. I. Geoffroy compares them; they are much more those of a Genet, having short, arched, webbed toes and very acute retractile claws.

\* Tail ringed; "soles of hind feet narrow." *Galidia*.

#### 1. *Galidia elegans*.

B.M.

Dark chestnut-brown; tail nearly as long as the body, black-ringed. Length 15 inches, tail 12 inches.

*Galidia elegans*, I. Geoff. *Mag. de Zool.* 1839, p. 27, t. 14, 17; Gray, P. Z. S. 1864, p. 523.

*Margusta* (*Galidia elegans*, Blainv. *Ost.* t. 9.

*Genetta?*, A. Smith, *S. Afr. Quart. Journ.* p. 52 (see I. Geoff.).

*Vounsira*, Flacourt, *Histoire de Madagascar*, p. 154, 1661.

*Vausire*, Buffon & Daubenton?

*Hab.* Madagascar (called *Vounsira*).

Skull oblong, rather elongate; forehead shelving, rather convex; the crown flat; the brain-case nearly two-thirds the entire length. False grinders  $\frac{3}{3}$ , the first very small, deciduous, the second and

third compressed; the flesh-tooth trigonal, considerably longer than broad at the front edge—the internal tubercle large, and a little behind the front margin. Tubercular grinders—the first subtruncate, oblong, rather wider than long, contracted on the inner side; the second very small, transverse, oblong (see I. Geoff. *l. c.* t. 17).

In the figure cited the brain-cavity is nearly three-fifths the entire length of the skull (that is, measured to the back of the orbits); and the zygomatic arch is rather wider than half the length of the skull.

\*\* Tail one colour; "soles of hind feet more bald." Salanoia.

## 2. *Galidia concolor*.

Red-brown, black-dotted; tail like back, much shorter than the body; ears broad and short. Length 13 inches, tail 7 inches.

*Galidia concolor*, I. Geoff. *Mag. Zool.* 1839, p. 30, t. 15; Gray, *P. Z. S.* 1864, p. 523.

*Galidia unicolor*, I. Geoff. *Compt. Rend. Acad. Sci.* 1837, v. p. 581.

*Hab.* Madagascar.

## 3. *Galidia olivacea*.

Olive-brown, yellow-dotted; tail same colour as the body; false grinders  $\frac{3}{2}$ ; tubercular grinders broader than in *G. elegans*, especially the hinder ones.

*Galidia olivacea*, I. Geoff. *Mag. de Zool.* 1839, t. 16; Gray, *P. Z. S.* 1864, p. 523.

? La petite fouine de Madagascar, Sganzin in *Rev. et Mag. de Zool.* 1855, p. 41.

*Hab.* Madagascar (Bernier) (called "Salano").

# Tribe V. HEMIGALINA.

The toes and the middle of the lower part of the tarsus bald; the upper part and sides of lower part hairy. Tail ringed. Fur soft. Frenum hairy. Orbit imperfect.

## 8. HEMIGALEA.

Head conical. Nose bald, flat, and with a distinct central groove below; nostrils lateral. Ears moderate, ovate, covered with hair externally. Whiskers numerous, very long, rather rigid, with tufts of slender bristles on the throat, cheeks, and eyebrows. Toes 5/5. Claws acute, semiretractile. Hind feet semiplantigrade; the upper part of the sole hairy, with a narrow bald sole in front below. Frenum covered with hair. Teeth 40; false grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ ; tubercular grinders  $\frac{2}{1}$ .  $\frac{2}{1}$ .

Hemigalea (Hemigalus), Jourdan, *Compt. Rend.* 1837; *Ann. Sci. Nat.* viii. p. 276, 1837 (not characterized); Gray, *P. Z. S.* 1864, p. 524.

The genus is only very indistinctly characterized by M. Jourdan in the papers referred to.



**Hemigalea Hardwickii.**

B.M.

Pale yellow; three streaks on the head, two streaks on the nape, some marks on the ears, five crescent-like bands across the back, two rings on the base of the tail, and the end of the tail black.

*Viverra Hardwickii*. Gray, *Spic. Zool.* ii. p. 9, t. 1 (not Lesson).

*Hémigale zébré*, *Voyage de la Bonite*, t. ; Jourdan, *Ann. Sci. Nat.* viii. p. 277.

*Viverra boiei*, S. Müller, *Zoog. ind. Arch.* t. 18; Schinz, *Syn. Mamm.* i. p. 363.

*Paradoxurus derbianus*, Gray, *Loudon's Mag. N. H.* i. (1837) p. 579; *De Blainv. Ost. Atlas*, t. 7, t. 12 (teeth).

*Paradoxurus? zebra*, Gray, *Loudon's Mag. N. H.* i. (1837) p. 579 (from a drawing).

*Paradoxurus philippensis* (partly), Schinz, *Syn. Mamm.* i. p. 387.

*Hemigalea Hardwickii*, Gray, *P. Z. S.* 1864, p. 524.

*Hab.* Malacca (*Major Farquhar*); Borneo (*Lowe*).

The skull agrees with *Genetta* and *Nandinia* in the hinder opening of the palate being only a short distance behind the line between the back edges of the hinder tubercular grinders. The orbit is very incomplete. The teeth are short, broad, and very unlike those of *Genetta* and *Nandinia*—somewhat similar to those of the genus *Paguma*. The first and second false grinders are compressed, the third has an inner lobe on the middle of the inner side. The flesh-tooth is triangular, scarcely longer than the width of the middle of the tooth, the large inner lobe occupies nearly the whole inner side. The tubercular grinders are oblong, triangular, much wider than long, rounded on the inner side; the hinder one like the front, but only about half the size. The nose of the skull is elongate. The brain-cavity ovate, ventricose, not suddenly constricted in front. Forehead shelving, rather convex. The bullæ of the ears are oblong, elongate, vesicular, truncated behind, and keeled on the outer edge. Length of the skull 3" 9", of nose 1" 4½", of zygomatic arch and orbit 1" 6"; width of brain-case 1" 3", of back of mouth 6" 1½", of zygoma 1" 10".

**Tribe VI. ARCTICTIDINA.**

The hinder part of the tarsus bald and callous. The tail thick, strong, and prehensile. Fur harsh, bristly. Ears pencilled. Frenum hairy. Orbit of skull imperfect, only defined by a prominence above.—Gray, *P. Z. S.* 1864, p. 523.

**9. ARCTICTIS.**

Head conical. Whiskers numerous, long, rigid, more slender on the cheeks, throat, and eyebrows. Nose acute; underside flat, with a broad central groove. Eyes small. Ears closely covered with long hairs, forming a pencil. Toes 5/5. Claws compressed, acute, retractile. Soles of hind feet broad, entirely bald and callous to the heel. Tail conical, covered with long hair, convolute. Frenum



covered with hair? Teeth 36; false grinders  $\frac{2}{3} \cdot \frac{2}{3}$ ; tubercular grinders  $\frac{2}{1} \cdot \frac{2}{1}$ .

*Arctictis*, *Temm. Monogr.* xx. p. 21, 1820?; *Gray, P. Z. S.* 1864, p. 525.

*Ictides*, *F. Cuvier*; *Valenciennes, Ann. des Sci. Nat.* iv. p. 57, 1825;

*Férus. Bull. Sci.* v. p. 266, 1825.

*Hab.* Asia.

Major Farquhar says, "It climbs trees, assisted by its prehensile tail, in which it has uncommon strength." M. F. Cuvier (*Mém. Mus.* ix. p. 46) doubts this fact; but he is wrong, as any one may see by observing the living animal in the Zoological Gardens.

#### *Arctictis binturong.* (Binturong.)

B.M.

Black. Younger with more or less long white tips to the hairs; young, pale dirty yellow. Varies in the quantity and length of white tips of the hairs.

*Viverra?* *binturong*, *Raffles, Linn. Trans.* xii. p. 253.

*Arctictis binturong*, *Temm. Monogr.* ii. p. 308; *Gray, P. Z. S.* 1864, p. 525.

*Arctictis penicillatus*, *Temm. Monogr.* ii. t. 62; *Müller, Zoog. ind. Arch.* p. 32.

*Paradoxurus albifrons*, *F. Cuvier, Mém. Mus.* ix. p. 44, t. 4; *Mamm. Lithogr.* t.

*Ictides*, *F. Cuv. Dents des Mamm.* p. 104, t. 34.

*Ictides ater*, *F. Cuvier, Mamm. Lithogr.* t.

*Ictides albifrons*, *Valenc. Ann. Sci. Nat.* iv. p. 57, t. 1; *F. Cuvier, Mém. Mus.* ix. t. 4.

*Hab.* Malacca (*Farquhar*, 1819); Sumatra (*Raffles*); Java (*Temminck*); Tenasserim and Arracan (*Cantor*); Assam, Nepal (*Blyth*).

Skull of young animal elongate. Teeth 36; canines slender; grinders small and far apart; the false grinders, first and second conical, the third compressed; the flesh-tooth small, triangular, inner side rounded; tubercular grinder oblong, trigonal, with a rounded inner edge, larger than the flesh-tooth. Length of skull 4" 6"; of nose 1" 6"; width of brain-case 1" 7"; of zygomatic arch 2" 4".

In the adult skull, false grinders  $\frac{3}{6} \cdot \frac{3}{6}$ , compressed, the third triangular; the flesh-tooth triangular, as broad as long, inner edge rounded, with the inner tubercle in the middle; the tubercular grinders small, the first triangular, somewhat like the flesh-tooth, but smaller, the hinder very small, cylindrical (*Temm. Monogr.* ii. t. 50).

The skeleton agrees with *Paradoxurus* in the large number (34) of caudal vertebrae, but differs from it in having a more plantigrade character in the bones of the feet (*Temm. Monogr.* ii. p. 307).

M. Temminck (*Monogr.* ii. p. 308) proposed to arrange *P. aureus* of F. Cuvier with this genus, as it could not be classed with any other group, observing that it is described from a very young specimen not more than one or two months old; and he objects to species being described on such specimens.

## Tribe VII. PARADOXURINA.

The hind part of the tarsus bald and callous. The tail cylindrical, hairy, very long, of many vertebræ, revolute. The frenum with a secretory gland. Head elongate. Pupil linear, erect. Orbit of skull generally only defined by a slight prominence above.—Gray, *P. Z. S.* 1864, p. 526.

This is an exceedingly natural group, well defined by its external characters and general appearance; at the same time the form of the skull and the teeth of the different species present so great an amount of variation that, if one studied the skull only, one would be inclined to distribute them among several different tribes of Carnivora—an instance, among many, which shows the necessity of studying the animal as a whole, and of not devoting one's attention more to the osteological than the external characters, or *vice versa*.

The gland on the frenum, which is the peculiar character of the genus *Paradoxurus*, was known to Pallas, who called the species *Viverra hermaphrodita* on account of it. It was redescribed and figured by Otto, but overlooked by F. Cuvier when he named the genus from a specimen with a distorted tail!

M. Temminck observes, "Nom générique donné à tout hasard par F. Cuvier, dont il faut se garder de ne rendre l'application strictement applicable à aucune des espèces de ce groupe."

"La forme et le pouvoir que M. F. Cuvier attribue à cette queue sont basés sur des observations faites sur un sujet soumis à l'état captif, mais ne sont nullement caractérisés pas moins spécifiquement pour son *Pougonné*, notre *Paradoxurus typus*—la Marte des Palmiers du Buffon."—*Mon. Mamm.* ii. p. 312.

If M. Temminck had observed many of these animals alive, he would have found that many of them have the habit of curling up the end of the tail as it lies on the ground, and that the ends of the tails of those in confinement are often worn away on the side from this habit (see also Bennett, *P. Z. S.* 1835, p. 118).

M. Temminck describes the claws as "not retractile" (*Monogr.* ii. p. 312); but Mr. Turner, in his interesting observations on the anatomy of *Paradoxurus typus*, describing the feline habit of the animal, states that the claws are quite as retractile, and scale off at the ends to keep them sharp, as in the Cat; he also says the preputial gland secretes the odorous exhalation (see *Proc. Zool. Soc.* 1849, p. 24).

"The *Paradoxuri* are in habits like the Civets; their glandular secretion is peculiar, not civet- or musk-like."—Cantor, *Cat.* p. 32.

Tail very long; caudal vertebræ 36 or 38.

The species of this group have been very imperfectly understood. In the 'Proceedings of the Zoological Society' for 1832 I gave a monograph of the species which the specimens and other materials then available afforded; and I revised the species in the 'Magazine of Natural History' for 1837. The number of species described



being so much larger than was then known on the Continent, seems to have excited the distrust of the continental zoologists as to their distinctness.

M. Temminck, in the second volume of his 'Monographie,' published an essay on the genus, and states that he was indebted to Mr. Ogilby for his assistance. But I fear he must have misunderstood some of Mr. Ogilby's observations; for I can hardly think that an English zoologist, who, from his position as Secretary of the Zoological Society, must have seen many species of the genus alive, could have had such an imperfect acquaintance with the specimens that are to be seen in our menageries.

M. Temminck's 'Monograph' is accurate as far as regards the species which inhabit the Asiatic possessions now or formerly under the Dutch rule. But M. Temminck seems to be entirely unacquainted with the species of continental India and China; he confused, under the same description, species that are very unlike in external characters; some of his figures of the skull do not agree with the skulls of the species which we have extracted from the skins. I may observe that it was formerly the great defect of the osteological collection at Leyden that many of the skeletons had been purchased at sales of private collections in London and elsewhere; so that the accuracy of the determination of the species from which the skulls were obtained solely depended on the accuracy or knowledge of the proprietor, generally more of an anatomist than a zoologist; and as the skin was not kept, there was no means of verifying the name. Hence it is very likely the Nepal *P. Grayi* was called in the collection from which it was obtained *P. musanga* of Java. M. Schlegel has been remedying this defect by the preparation of skeletons from well-determined specimens.

M. Jourdan observes, "Ce que nous pouvons dire c'est que dans la collection ostéologique du Muséum il existe des têtes osseuses qui, sous le nom commun de *Paradoxurus typus*, indiquent au moins quatre espèces, et que dans chacune d'elles on peut aisément distinguer une différence tranchante de disposition carnassière."—*Ann. Sci. Nat.* viii. p. 275, 1837.

The development of the auditory bulla is variable in the genera and species. In *Paguma*, *Paradoxurus*, and *Arctogale* the bulla is large, ventricose, slightly keeled along the lower edge, with a triangular end. In *Nandinia* it is very small, not inflated, and scarcely raised. It varies in form in the different species of *Paradoxurus*, being smallest in *P. bondar*.

The hinder part of the palate of the skull also affords good characters, thus:—

1. The hinder opening of the palate is wide, and nearly in a line with the hinder edge of the last grinder, in *Paradoxurus* and *Nandinia*.

2. The hinder opening of the palate is wide, and further back than the hinder edge of the last grinder, in *Paguma* and *Arctictis*.



3. The hinder opening of the palate is narrow, at the end of a narrow depressed tube, and considerably further back than the hinder edge of the last grinder, in *Arctogale*.

The specimens which are in the British Museum Collection may be divided and arranged thus, from what has been called the "most carnivorous" to the "most omnivorous" form of teeth:—

1. The flesh-tooth very narrow, with a small internal process on the front edge. *Nandinia binotata*.
2. The flesh-tooth rather narrow, with a rather small internal lobe on the front edge. *Paradoxurus bondar*.
3. The flesh-tooth rather wider, with a moderate-sized internal lobe on the front edge; teeth moderate. *P. Crossii*, *P. nigrifrons*, and *P. zeylanicus*.
4. The flesh-tooth triangular, broad, massive, with a large internal lobe occupying a great part of the inner side.
  - a. The teeth elongate, large, massive. *Paradoxurus musanga*, *P. philippensis*, *P. macrodus*, and *Paguma leucomystax*.
  - b. The teeth shorter and broader, moderate or small. *Paguma Grayi*, *P. larvata*, and *Arctogale trivirgata*.

They may be arranged, according to the form of the adult skull, thus:—

1. The brain-case wide in front, scarcely constricted. Orbit indistinctly marked. Nose broad. *Paguma larvata* and *P. leucomystax*.
2. The brain-case wide in front, and distinctly constricted. Nose rather elongate.
  - a. Orbit marked only with a short blunt process on the upper hinder edge. *Paguma Grayi*.
  - b. Orbit marked with a rather short, acute, well-marked process on the upper hinder edge. *Nandinia binotata*.
3. The brain-case narrow, and evidently and distinctly constricted in front. The orbit undefined.
  - a. The face broad; width at the tubercular grinder about four-fifths the length of the palate. *Paradoxurus philippensis*, *P. Crossii*, *P. nigrifrons*, *P. fasciatus*, and *P. macrodus*.
  - b. The face rather elongate; width at the tubercular grinder two-thirds of the length of the palate. *P. zeylanicus*, *P. bondar*, and *P. hermaphroditus*.
4. The brain-case narrow, suddenly and distinctly constricted in front. The orbit well defined behind. *Arctogale trivirgata*.

The following table may facilitate the determination of the species in the Museum from their external appearance:—

- a. *Fur thick, very hairy, rigid, not striped, without any spots under the eyes.* *Paguma leucomystax.*
- b. *Fur very thick, long, with longer rigid hairs, not striped or spotted, but with a spot under the eye.* *Paguma Grayi, Paradoxurus bondar.*
- c. *Fur thick, soft, with longer rigid hairs, with a spot under the eye.* *Paradoxurus hermaphroditus.*
- d. *Fur very thick, close, soft, of nearly uniform length, with a spot under the eyes; cheek whitish, with small dark spots.* *Paradoxurus Crossii, Paguma larvata, Paradoxurus philippensis, P. nigrifrons, P. musanga, and P. dubius (cheek dark).*
- e. *Fur soft; back striped; with no spots under the eyes or on the face.* *Arctogale trivirgata.*
- f. *Fur soft, thick, close; back spotted; with two yellow spots on the shoulder.* *Nandinia binotata.*
- g. *Fur very soft, of a uniform colour, with no spot under the eye or on the face.* *Paradoxurus zeylanicus.*

#### 10. NANDINIA.

Nose conical; underside flat, with a distinct central groove. Frenum covered with hair (?). Nose of skull compressed, produced. The brain-case rather constricted in front behind the orbit. The orbit incomplete, with a well-marked acute process from the forehead, and none from the zygomatic arch behind. The forehead flat, rhombic; produced, angular behind the orbit. Palate wide behind. Teeth 40; false grinders  $\frac{3}{4} . \frac{3}{4}$ ; flesh-tooth elongate, narrow, with a small internal lobe on the front edge; the hinder tubercular very small, circular.

The skull is figured by De Blainville (*Ostéogr., Viverra*, t. 6) as that of *Paradoxurus? Hamiltonii*.

*Nandinia*, Gray, *P. Z. S.* 1864, p. 529.

#### *Nandinia binotata.* (Nandine.)

B.M.

Nape with three black parallel streaks, one from the forehead, the other from the ears. Back with numerous black spots. Withers each with a yellow spot. Lips, throat, and beneath rufous grey. Legs grizzled, not spotted. Tail elongate, tapering, with many narrow black rings; end blackish. Length 23 inches, tail 19 inches.

*Nandinia binotata*, Gray, *Cat. Mamm. B. M.* p. 54: *P. Z. S.* 1864, p. 530.

*Viverra binotata*, Reinwardt, *MS.*; Gray, *Spic. Zool.* p. 9.



*Paradoxurus Hamiltonii*, Gray, *P. Z. S.* 1832, p. 67; *Illust. Ind. Zool. t.*; *Temm. Monogr.* ii. p. 336, t. 65. f. 1.

*Paradoxurus* ? *binotatus*, Gray, *P. Z. S.* 1832, p. 68; *Temm. Monogr.* ii. p. 336, t. 65. f. 7-9 (skull).

*Hab.* West Africa: Fernando Po (*Cross*); Ashantee (*Mus. Leyden*); Guinea (*Mus. Leyden*).

Varies in the brightness and rufous tint of the fur, and also in the size of the spots; in some they are much larger, and apparently fewer, than in others.

Orbit of skull not defined behind, confluent with the zygomatic cavity. Upper false grinders 3, compressed, first small, third without any distinct inner lobes; flesh-tooth elongate, outer edge considerably longer than the width of the front edge, inner tubercle on the front edge; tubercular grinders two, front triangular, rather wider than the length of the outer edge, hinder small, circular. Length of skull 3" 4"', of nose 1" 1"'; width of brain-case 1" 2½"', of zygoma 1" 10''.

## 11. PARADOXURUS.

Head conical. Nose flat, and with a central groove beneath. Whiskers numerous, strong, elongate. Pupil linear, erect. Toes 5/5. Frenum bald, glandular. The skull with the brain-case strongly and suddenly constricted in front; forehead small, transverse, truncated behind. The orbit very incomplete, with only a short conical prominence above behind, and none on the zygomatic arch below; hinder part of the palate moderate, with only a very slight notch at each side on its front edge. Teeth 40, large; false grinders  $\frac{3}{2} . \frac{3}{2}$ ; the flesh-tooth triangular or subelongate; the tubercular oblong, transverse.

*Paradoxurus*, *F. Cuv. Mamm. Lithogr.* ii. t. 1821; Gray, *P. Z. S.* 1864, p. 530.

*Platyschista*, *Otto, Nov. Act. Acad. Leop.* xvii. p. 1090, 1835.

*Viverra hermaphrodita*, *Pallas*.

M. Temminck, in his 'Monographies de Mammalogie,' vol. ii. p. 312 (published in 1855), has given a monograph of this genus; the synonyms are very incorrect.

\* *The skull elongate; the nose slender; the width of the head at the last tooth two-thirds the length of the palate; the flesh-tooth elongate, rather narrow, with a small internal lobe on the front edge.* Bondar. —Gray, *P. Z. S.* 1864, p. 531.

### 1. *Paradoxurus bondar*.

B.M.

Fur very long, hairy, rather rigid, dirty yellowish white varied with the long black tips of the longer and more rigid hairs; end of nose brown, generally with a white central streak. The feet, outer side of fore legs, and end of the tail blackish.

*Ichneumon bondar*, *Buchanan, MS.*

*Viverra bondar*, *De Blainville, Journ. de Phys.*

*Paguma bondar*, *Horsfield, Cat. Mus. E. Ind. Comp.* p. 68.



*Paradoxurus bondar*, Gray, *P. Z. S.* 1832, p. 66; *Illustr. Ind. Zool.* t.; *P. Z. S.* 1864, p. 531.

*Paradoxurus Pennantii*, Gray, *P. Z. S.* 1832, p. 66; *Illustr. Ind. Zool.* t.

*Paradoxurus hirsutus*, Hodgson, *Asiatic Researches*, xix. p. 72, 1836. *Genetta bondar*, Lesson, *Mamm.* p. 175.

*Hab.* Nepal; North Behar and Tarai (*Hodgson*).

This species is easily known from *P. Grayi* by the rigid harshness of the fur and the dark colour of the outside of the legs.

Skull narrow, elongate. False grinders distant, the third trigonal; flesh-tooth narrow, elongate, the outer edge longer than the width of the front edge, with the inner lobe on the front margin; tubercular grinder oblong, transverse, rather narrower and rounded on the inner side, wider than long; the hinder tubercular small, oblong, subcircular. Length of skull  $4'' 1\frac{1}{2}''$ , of nose  $1'' 5''$ ; width of brain-case  $1'' 4\frac{1}{2}''$ , of zygoma  $2'' 3''$ .

\*\* *The skull moderately broad; the width of the head at the last tooth about four-fifths of the length of the palate; the flesh-tooth rather longer than wide in front, with a moderate-sized internal lobe on the front edge.* *Platyschista*.—Gray, *P. Z. S.* 1864, p. 531.

## 2. *Paradoxurus zeylanicus*.

B.M.

Nearly uniform brown or dark brown; the longer hairs with a bright golden tint; ears nearly naked; whiskers pale brown; tail subcylindrical, sometimes with a single yellow or pale subterminal band; heel of hind feet hairy. Length of body and head 21 inches, tail 17 inches.

*Paradoxurus zeylanicus*, Gray, *Cat. Mamm. B. M.* p. 55; *P. Z. S.* 1864, p. 531.

*Viverra zeylanica*, Pallas in Schreb. *Säugeth.* 45.

*Viverra ceylonensis*, Bodd.

? *Paradoxurus aureus*, Desm. *Mamm.* p. 540; *F. Cuvier*, *Mém. Mus.* ix. p. 47, t. 4.

*Paradoxurus typicus*, De Blainv. *Ostéogr. Viverra*, t. 12 (teeth), t. 7 (skull, good).

? *Arctictis aureus*, Fischer, *Syn. Mamm.* p. 158.

*Hab.* Ceylon (*Pallas*, *Kelaart*).

These animals differ in the intensity of the colour of the fur; some are bright golden, and others much more brown; the latter is *P. fuscus* of Kelaart. One of the Museum specimens has a bright yellow ring near the tip of the tail.

Third upper false grinders with only a slight indication of a lobe in the middle of the inner edge; the flesh-tooth with the outer edge scarcely longer than the width of the front edge; first tubercular large (with the inner edge narrower than the outer one), larger than in *P. philippensis*.

Dr. Kelaart has described, and we have in the British Museum, two varieties of *P. zeylanicus* differing in the intensity of the colour of the fur. In the British Museum we have three skulls, with their permanent teeth, said to have been sent from Ceylon, one being from

the skin in the collection sent by Dr. Kelaart: one is larger and rather broader than the other two, which are younger. In two of them the flesh-teeth are nearly similar, with a moderate-sized internal lobe, and the first and hinder upper tubercular grinders are much larger in one of these than in the other. In the third skull, which is the larger, the internal lobe of the flesh-tooth is much longer, compared with the size of the outer portion, than in the preceding skulls; and the first tubercular grinder is much larger, longer, and more massive compared with its width than in either of the preceding; in this skull the hinder tubercular is not yet developed.

Is it that these skulls belong to, and are characteristic of, the two animals which we have thus wrongly called varieties? or does the difference merely arise from their being of two sexes? Genera have been formed on less differences in the Carnivora.

### 3. *Paradoxurus hermaphroditus*.

B.M.

Fur long, rigid, harsh, blackish more or less varied with the pale colours of the lower part of the hairs, scarcely showing three indistinct black streaks on the back; under-fur thick, soft, and very pale reddish; the feet and end of the tail black; spot under the eye and the forehead paler, more or less grey or whitish.

*Viverra hermaphrodita*, Pallas, Schreb. *Säugeth.* p. 426.

*Paradoxurus hermaphrodita*, Gray, *P. Z. S.* 1832, p. 69; 1864, p. 532.

*Platyschista Pallasii*, Otto, *N. Act. Leop.* xvii. p. 1089, t. 71, 72.

*Viverra nigra*, Desm. *Mamm.* p. 208 (from Buffon, *Suppl.* iii. t. 47).

La Marte des Palmiers, ou le Pougonne, F. Cuv. *Mamm. Lithogr.*

*Paradoxurus typus*, F. Cuv. *Mamm. Lithogr.*; Temm. *Monogr.* ii. p. 215.

Genette de France, Buffon, *H. N.* vii. p. 58; *Suppl.* iii. t. 47.

Musk or Musky Weasel, Penn. *Quadr.*

*Hab.* Continental India, in the plains: Bengal (Temm.); Madras (Jerdon).

This species differs from the preceding in being small and much blacker. Only one of the wild specimens in the Museum, in a good state of fur, shows any indication of the three black dorsal streaks; but the fur can easily be placed so as to make three more or less interrupted ones apparent: and some of the specimens, which have the tips of the longer hairs worn off, have a somewhat striped appearance on the back; but this evidently depends only on the bad state of the specimens from their having been kept in confinement.

The skull is very like that of *P. zeylanicus*; the teeth are rather larger, the nose rather narrower in front; the flesh-tooth is rather broad and thick; the front tubercular grinder is transverse, narrower on the inner side, and contracted in front and behind in the middle; the hinder tubercular is very small and circular; the palate-edge is arched behind. The skull is very old, and the orbit is rather more defined behind than usual.

The *Viverra hermaphrodita* of Pallas is thus described:—"Ashy-



black hairs, grey at the base, black at the tip; beneath pale, a white spot under the eye; ears, throat, and feet black; nose, whiskers, and back with three black streaks; tail longer than the body, black at the tip; claws yellow." Most probably this species is also the *Platyschista Pallasii* of Otto; but his figure makes the stripes on the back more distinct than they are usually seen, and the sides of the body too spotted; but it is easy to make a specimen look like the figure.

The figure of the teeth of *P. typus*, in De Blainville's 'Ostéographie,' better represents the teeth of our *P. zeylanicus* than of *P. typus*. Perhaps it is not from the skeleton figured on plate 2, which is said to be the animal described by F. Cuvier. The chief difference between the skulls of the two species is, that the internal lobe of the flesh-tooth in *P. zeylanicus* is in a straight line with the front edge of the tooth, whereas in *P. typus* it is rather in front of the outer part of the front edge of the tooth.

The skeleton of the animal first described by F. Cuvier as *Paradoxurus typus* is engraved by De Blainville, Ostéogr. t. 2.

#### 4. *Paradoxurus Crossii*.

B.M.

Fur short and close, erect, pale iron-grey without any spots or stripes, spot on side of nose, under orbit, forehead, and base of ears whitish; nose dark brown; feet and ends of the tail black.

*Paradoxurus Crossii*, Gray, *Proc. Zool. Soc.* ii. p. 67, 1832; *Illustr. Ind. Zool.* ii. t. 7; *P. Z. S.* 1864, p. 533.

*Paradoxurus musanga*, var., *Temm. Esq. Zool.* p. 120.

*Paguma Crossii*, Gray, *Cat. Mamm. B. M.* p. 54.

*Hab.* India (*Brit. Mus.*).

Described from an adult specimen that was confined in the Surrey Zoological Gardens. It is very like *P. Grayii*; but the fur is short, thick, and very close, and the colouring of the face is rather different. The nose is brown in the centre, with the brown colour extending under the eyes; the spot under the eye is small and indistinct.

The skulls of the type specimens of *P. Crossii* and *P. nigrifrons* in the British Museum are very much alike in general shape, in the breadth of the palate compared with the length, and in the form of the grinders, including the flesh-tooth. Considering the variations which individuals of the same species present, if we had had only the skulls, not knowing the characters of the fur and the colours of the two species, we might have considered them to be varieties of the same species. But knowing that they are the skulls of two very distinct species, one can perceive that the nasal bones are much longer, and the condyles of the skull larger and more oblique, in *P. Crossii* than the same parts in the skull of *P. nigrifrons*. The bulla of the ears is differently shaped, ending below in small acutely keeled prominences in *P. Crossii*, while in *P. nigrifrons* the whole outer hinder edge is strongly keeled. *P. Crossii* is rather narrower at the zygoma. These differences might be peculiar to the individual in each case; and I should not have considered them of



specific importance, if I had not known the external characters and appearance of the animals.

The measurements of the two skulls are as follows, in inches and twelfths :—

	<i>P. Crossii.</i>		<i>P. nigrifrons.</i>	
Length of skull .....	3"	9"	3"	10½"
— of nose .....	1	3	1	3
— of palate .....	1	9	1	9
Width of last grinders ....	1	3½	1	4
— of brain-case .....	1	3	1	3
— of zygoma .....	2	4½	2	1½

M. Temminck refers *Paradoxurus Crossii* to *P. musanga*, and ob-

Fig. 9.



Skull of *Paradoxurus Crossii*.

serves that "it is established on the same specimens as served as the model for the figure of Horsfield." How he could have made such

an extraordinary mistake I cannot conceive. *P. Crossii* was described from a specimen living in the Surrey Zoological Gardens, which did not arrive in this country until several years after Dr. Horsfield's work was published; and Dr. Horsfield's figure was drawn from a stuffed specimen collected by himself in Java, and for years exhibited in the Museum at the India House; while the type specimen of *P. Crossii* was, and is still, in the collection of the British Museum. I feel that little reliance can be placed on M. Temminck's statements as to his observations on type specimens. Probably in this case he was misled by misunderstanding some observations of Mr. Ogilby.

#### 5. *Paradoxurus nigrifrons*.

B.M.

Fur short, close, blackish grey varied with the black tips to the longer hairs; nose, crown, cheeks, and upper part of the throat and feet reddish black; tail-end black; a whitish spot on side of nose, under, and above the eyes: a streak at the base of the ears, and the sides of the throat behind the dark cheeks, whitish.

*Paradoxurus nigrifrons*, Gray, *Cat. Mamm. B. M.* p. 55; *Illustr. Ind. Zool. t.*; *P. Z. S.* 1864, p. 535.

*Hab.* India (*Brit. Mus.*). Single specimen.

The specimen is very like *P. Crossii* in the nature and colour of the fur; but it is rather darker in every part, and the crown and cheeks are reddish black, being in *P. Crossii* grey or whitish.

In the blackness of the cheeks and throat and the paleness of the forehead this species is allied to *P. musanga*; but the fur is shorter, and I cannot find any indications of dorsal streaks or spots, and the whiteness of the forehead is much more indistinct and diffused than in any specimens of that species I have seen. The specimen has been in confinement; but its fur is in very good condition.

\*\*\* *The skull broad; the width of the head at the last tooth about two-thirds of the length of the palate; the flesh-tooth broad, massive, triangular, with a large internal lobe occupying two-thirds of the inner side.* Macrodon.

#### 6. *Paradoxurus fasciatus*.

Fur short, close, blackish grey; back with five longitudinal black streaks, more or less broken, especially the side ones, into spots; sides, shoulders, and thighs with small spots; face, occiput, chin, throat, and end of tail black; forehead, spot on side of nose, and under orbit white.

*Viverra fasciata*, *Desm. Mamm.* p. 209.

*Genetta fasciata*, *Lesson, Mamm.* p. 174.

*Viverra Geoffroyii*, *Fischer, Syn. Mamm.* p. 171.

*Paradoxurus musanga*, *Gray, P. Z. S.* 1832, p. 16.

*Paradoxurus musanga*, var. *javanica*, *Horsf. Java, t.*; *Temm. Monogr.*

ii. p. 317, t. 53. f. 2-5, t. 54. f. 1, 2, 3 (skulls).

*Viverra musanga*, *Raffles, Linn. Trans.* xiii. p. 255.

*Musang*, *Marsden, Sumatra*, p. 110 t. 1<sup>o</sup>



*Paradoxurus typus*, var. *sumatranus*, *Fischer, Syn. Mamm.* p. 159.  
*Paradoxurus setosus*, *Homb. & Jacq. Voy. de l'Astr. Zool.* iii. p. 25, t.  
*Paradoxurus fasciatus*, *Gray, P. Z. S.* 1864, p. 536.

*Var. 1.* Forehead more white.

? *Paradoxurus Pallasii*, *Gray, P. Z. S.* 1832, p. 67; *Illustr. Ind. Zool.* t.

? *Paradoxurus albifrons*, *Bennett, in Zool. Gardens List* (not of *Cuvier*).

*Var. 2.* Tip of tail white.

*Hab.* Malacca, Java, Sumatra, Borneo (*Horsfield*).

The size of the spots on the face and the extent and pureness of the white on the forehead vary; but the animal always has a distinct brown or black mark on the back of the cheeks, most distinctly defined on the lower part of the face. The species has been divided into several on account of these differences. A specimen from Borneo in the Museum is so black that the spots are scarcely to be distinguished; but there are specimens in the collection that are intermediate between it and those which have the common colour of the species.

The skull is like that of *P. nigrifrons*; the teeth are much more thick and massive, the flesh-tooth broader and with a much larger internal lobe; the first tubercular is more square, nearly as wide on the inner as on the outer side: the hinder tubercular is small, sub-circular; the palate has an angular notch behind; the zygomatic arch is also a little wider.

Length of the skull 4", of the nose 1" 4", of palate 1" 10½"; width at tubercular grinder 1" 6", at zygoma 2" 3", of brain-case 1" 5".

*Paradoxurus quinquelineatus* and *Paradoxurus musangoides*, *Gray, London's Mag. N. H.* i. p. 579, 1837, are perhaps only varieties of the young animal of this species.

*Viverra fasciata*, *Desm. Mamm.* p. 209 (not of *Gmelin*), described as pale yellow, with longitudinal series of brown spots, end of the nose and frontal cross band white, is also probably the same. It cannot be *Viverricula madagascariensis*, as the forehead is not particularly white. This is perhaps the *Platyschista* — ? which *Otto* notices in 'Nova Acta Acad. Leop.-Carol.' xvii. p. 1102.—*Hab.* Java? (*Mus. Paris.*).

7. *Paradoxurus dubius*.

B.M., type.

Pale yellowish ashy brown, with three indistinct, rather interrupted, darker bands and some indistinct darker spots on the sides; head, ears, and feet chestnut; forehead with an indistinct whitish band; spot on side of nose and under eyes white.

*Paradoxurus dubius*, *Gray, P. Z. S.* 1832, p. 66; 1864, p. 537.

*Hab.* Java (*Brit. Mus.*).

The skull is in the skin; so I have not been able to examine it. This species may be only a very pale variety of *P. fasciatus*.



8. *Paradoxurus philippensis*. B.M., type.

Fur blackish, with a silvery gloss; spot under eyes distinct; cheeks dark brown; head, feet, and the greater part of the tail blacker; the back with three indistinct narrow black streaks, which converge near the rump, and with a series of very indistinct small ones on the upper part of the sides; sides of forehead, chest, and beneath whiter; whiskers white and black: ears hairy.

Var. 1. Dorsal stripes none. B.M.

Var. 2. Albino, yellowish white. B.M.

*Martes philippensis*, *Camellus*, *Phil. Trans.* xxiv. p. 2204.

*Paradoxurus zeylanicus* (partly), *Gray*, *Cat. Mamm. B. M.* p. 55.

*Paradoxurus philippensis*, *Temm. Monogr.* ii., *Esq. Z.* p. 120 (not *Jourdan*); *Gray*, *P. Z. S.* 1864, p. 537.

*Paradoxurus aureus*, *Waterhouse*, *Cat. Zool. Soc.*

*Hab.* Manilla, Philippines: Casmiguind (*Cuming*).

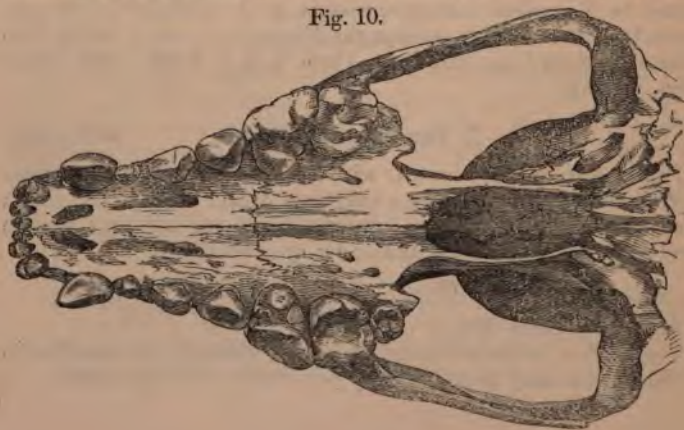
The colours vary much in intensity, and in the lighter and darker specimens the spots and streaks are scarcely visible; the white on the side of the forehead in front of the base of the ears also varies in distinctness and extent; the spot under the eyes is generally distinct. This species is like *P. nigrifrons* and *P. musanga* in many respects; but it differs from them both in the crown of the head being paler like the back, and from *P. nigrifrons* in having three dorsal stripes; but in one specimen, from the Philippines, these stripes are quite invisible; yet in every other respect this is like the other specimens, and it differs from the specimen of *P. nigrifrons* in the colour of the crown.

Third upper false grinder with a well-marked linear tubercle on the hinder inner edge; the flesh-tooth tubercular, the outer edge not longer than the width of the front margin; front tubercular tooth oblong, the inner and outer edge of about the same width, smaller than in *P. zeylanicus*.

9. *Paradoxurus macrodus*. B.M., type.

The skull with a rather elongated nose; the third upper false

Fig. 10.



grinder has a well-marked ingillum and a rudimentary lobe on the inner side. The flesh-tooth is very massive, with four large and two

Fig. 11.

Figs. 10 & 11.—Skull of *Paradoxurus macrodus*.

small cones; the inner lobe occupies more than half the inner part of the tooth, with two unequal cones, the front one being nearly as large as the middle one on the outer side. The front tubercular very large, oblong, with nearly equal sides and large tubercles; the hinder upper tubercular much smaller, circular. Length of skull 4" 4"', of nose 1" 6"'; width of brain-case 1" 5"', of zygoma 2" 3'''.

*Paradoxurus macrodus*, Gray, *P. Z. S.* 1864, p. 538.

*Hab.* — ?

## 12. PAGUMA.

Nose flat beneath, with a central longitudinal groove. Pupil linear, erect. The skull broad, short. Brain-case broad between the orbits, only moderately constricted in front; forehead triangular behind, extending beyond the back edge of the orbits. The orbit very incomplete, with a very short acute prominence above behind, and none on the zygomatic arch below; hinder part of palate broad, with a very slight notch on each side of its front edge; the front of the palate broad, about as wide as three-fourths of its length. Teeth small or moderate; flesh-tooth triangular, the front edge about as broad as long on the outer edge; the front tubercular oblong, inner edge shorter, rounded.

*Paguma*, Gray, *Zool. Misc.* p. 9, 1831; *Proc. Zool. Soc.* i. p. 95, 1831; ii. p. 65, 1832; 1864, p. 539.

? *Amblyodon*, Jourdan, *Compt. Rend.* 1837.

The skull of this genus is easily known by the distinct forehead, the edge of the temporal muscles even in the oldest specimen leaving a plane triangular space over the back of the eyes.

This genus was first established on an animal that had not completely shed its teeth; but the examination of the adult skull has justified the separation.



The following are the most prominent peculiarities of the skulls of the three species:—

1. *P. larvata* is the smallest, has the broadest nose (as shown by the shape of the roof of the mouth or palate) and the smallest teeth.

2. *P. Grayi* is next in size, has a longer and narrower nose, larger teeth, and a larger and more convex forehead.

3. *P. leucomystax* is the largest, with a short, very broad nose, and wide palate, and very large massive teeth.

The hinder opening of the palate in *P. larvata* and *P. leucomystax* is angularly cut out behind; in *P. Grayi*, arched out. The brain-case is widest and least contracted in front in *P. larvata* and *P. leucomystax*, and most so in *P. Grayi*. This contraction becomes more decided as the specimens increase in age.

\* Skull short; brain-case scarcely constricted in front; the nose very broad. Paguma.

#### 1. *Paguma larvata*.

B.M., type.

Fur grey-brown; head, neck, whiskers, feet, and end of the tail black; chest, streak up the face and forehead, and spots above and beneath the eyes whitish grey.

*Paguma larvata*, Gray, *P. Z. S.* 1830, p. 95; 1831, p. 65; 1864, p. 539.

*Gulo larvatus*, Temm.; *H. Smith, Griffith's A. K.* ii. p. 281, t.

*Viverra larvata*, Gray, *Spic. Zool.* p. 9.

*Paradoxurus larvatus*, Gray, *P. Z. S.* 1832, p. 67; *Illustr. Ind. Zool.* t.; *Temm. Monogr.* ii. t. 65, f. 1-3, t. 55, f. 1-3 (skull).

*Hab.* China (*J. Reeves*, 1827); Formosa (*Swinhoe*).

Flesh-tooth oblong, trigonal, rounded at the corners, about as wide as the length of the outer edge; the inner lobe occupying nearly the whole of the inner side, rounded internally. The soles are bald nearly to the heel. The hair is dull grey-brown, with a black ring and whitish tips; the hairs of the blacker part are black nearly to the base; the white on the chest is spread out laterally on the front of the shoulder.

M. Temminck, after giving the proper synonyms of this species, continues, "M. Ogilby indique encore *Paradoxurus laniger*, Hodgson, et *P. Grayi*, Bennet" (*Proc. Zool. Soc.* for 1836, p. 118); and adds, "Patrie: M. Ogilby, qui a vu à Londres une douzaine d'individus de cette espèce, me dit qu'elle vient du continent de l'Inde. Elle vit dans toute la chaîne basse des monts Himalaya. Le plus grand nombre vient du Népal. Il est probable que le sujet du musée dans les Pays-Bas vient aussi de cette contrée, ayant été acquis à Londres."—*Mon. Mamm.* ii. p. 331.

The whole of these observations of Mr. Ogilby refer to a species quite distinct (indeed having no relation to *P. larvata*), which does inhabit Nepaul, while *P. larvata* has not hitherto been received from anywhere but China, and appears to be the species of that country. It is the less excusable that M. Temminck should have made such a comparison, when the true habitat is given in the description of



the animal in the 'Proceedings of the Zoological Society,' which he quotes, and I have never yet seen the *P. larvata* alive in this country.

## 2. *Paguma leucomystax*.

E.M., type.

Black-brown, with elongated black shining hairs; orbits dark brown; face pale, without any orbital spots, a large spot at the lower angle of the ear; tip of the tail black (rarely white); whiskers rigid, white; ears large and rounded, not bearded.

*Paguma leucomystax*, Gray, *Cat. Mam. B. M.* p. 55; *P. Z. S.* 1864, p. 540.

*Paradoxurus leucomystax*, Gray, *Loud. Mag. N. H.* 1837; *Temm. Monogr.* ii. p. 325, t. 64, f. 4-6 (skull).

*Var. 1.* Tip of tail white; white on face more extended.

*Paradoxurus Ogilbii*, Fraser, *Zool. Typica*, t.; *Temm. Esq. Zool.* p. 120.

*Paradoxurus leucocephalus*, Gray, *Voy. Samarang.* (B.M.)

*Paradoxurus philippensis* (partly), Schinz, *Syn.* p. 387.

*Var. 2.* Albino.

*Hab.* Sumatra and Borneo (*Mus. Leyden*).

The lower and longest whiskers are white, and the upper ones (which are placed just above them) are black and more slender.

The half-grown specimen, which I described as *Paradoxurus leucocephalus*, appears, on recomparison with the series of specimens, to be only a specimen with more white on the head than usual. The fur is in a bad state, the animal having been kept in confinement. The tip of the tail is white, as in the *P. Ogilbii* of Fraser, which agrees with it in the whiteness of the head.

\*\* *Skull rather longer; brain-case slightly constricted in front; nose rather elongate, narrower; teeth small.* Amblyodon.

## 3. *Paguma Grayi*.

B.M.

Fur long and rigid, rather woolly, iron-grey, beneath paler; base of ears and sides of nose browner; tail elongate, flat at the base.

*Paguma Grayi*, Gray, *Cat. Mamm. B. M.* p. 54; *P. Z. S.* 1864, p. 541; *Cat. Hodgson Coll.* p. 9.

*Paradoxurus Grayi*, Bennett, *P. Z. S.* 1835, p. 18 (!).

*Paradoxurus larvatus*, var., *Temm. Esq. Zool.* p. 120 (!)

*Paradoxurus bondar*, *Temm. Monogr.* ii. p. 332, t. 55, f. 1-4 (skull, not syn.) (!).

? *Paradoxurus leucopus*, *Ogilby, Zool. Journ.* iv. p. 303 (? var.).

*Paradoxurus nipalensis*, *Hodgson, Asiatic Research. Bengal.* xix. p. 76, 1836 (!).

*Amblyodon doré*, *Jourdan, Ann. Sci. Nat.* viii. p. 276, 1837 (!).

*Paradoxurus auratus*, *De Blainville, Ostéogr. (Viverra)*, t. 12 (teeth).

*Paradoxurus Jourdanii*, Gray, *Loud. Mag. N. H.* i. p. 579, 1837 (from *Mus. Lyons*).

*Hab.* India: Nepal.

The spot on the side of the face, under the eye, is sometimes very indistinct. The blackish ends of the hairs of the back, when crowded

together at the crease of the neck, and when brushed towards the middle of the back, give the appearance of a dark band or streak; but there is no real band or streak in this species.

Skull swollen. False grinders moderate, rather compressed, conical, blunt, without any internal process; the flesh-tooth triangular, rather longer on the outer edge than the width of the front edge; the internal tubercles triangular, rather behind the front edge, inner side rather angular; tubercular grinders oblong, transverse, about as wide as the length of the outer edge, inner side narrower and rounded; hinder tubercular very small, circular. Length of skull  $4\frac{1}{2}$ "  $6\frac{1}{2}$ ", of nose  $1\frac{1}{2}$ "  $5\frac{1}{2}$ "; width of brain-case  $1\frac{1}{2}$ "  $6\frac{1}{2}$ ", of zygoma  $2\frac{1}{2}$ "  $6\frac{1}{2}$ ". This skull is much more ventricose, and the head is much shorter and broader, than in *P. bondar*.

*Paradoxurus leucopus*, Ogilby, Zool. Journ. iv. p. 303, t. 35, 1829, Temm. Esq. Zool. 120, "band round the loins, the feet, and the tip of the tail pure white," is probably, from the description, an accidental variety of the *P. Grayi*. The specimen does not appear to have been preserved.

I believe the specimen which I described in 1837, under the name of *P. Jourdanii*, 'Mag. of Nat. Hist.' i. p. 579, from a specimen which M. Jourdan purchased in London for the Lyons Museum, is the same as the one here described.

The only character that M. Jourdan gives for *Amblyodon* is the following:—"Cette à laquelle il a donné le nom d'*Amblyodon doré* est celle qui offre la disposition dentaire la plus omnivore, celle qui, par conséquent, rappelle le mieux ce qui a lieu dans les *Rasores*, chez lesquels les deux bords dentaires sont presque égaux en hauteur et en épaisseur, également tuberculeux, et ont les deux arrièremolaires approchant le plus d'être égales et semblables dans leurs côtés interne et externe. L'*Amblyodon* a un pelage fort grossier, rude, assez long et presque unicolore, seulement plus foncé en dessus, autour des yeux, avec les extrémités noires en dessus, comme la *Mustela*."—*Ann. Sci. Nat.* viii. p. 276, 1837.

This character suits more than one Indian species; but fortunately M. de Blainville, in his valuable 'Ostéographie,' has figured a skull under the name of *Paradoxurus auratus*, which is probably the one named by M. Jourdan, and certainly is the same as the *Paradoxurus Grayi* of Mr. Bennett. It may be observed that M. Jourdan was in England shortly after I had described the species in the 'Magazine of Natural History': he saw my specimens, and even referred to my paper in his 'Mémoire' (p. 275); but he redescribed my *Paradoxurus derbianus* as *Hemigale zébré*, and *P. Jourdanii* as *Amblyodon doré*, without reference to their synonyms, though the latter is from the same specimen, I believe, as I described with his permission.

See *Paradoxurus laniger*, Hodgson, MS. (*Paguma laniger*, Gray, Cat. Mamm. B. M. p. 55; P. Z. S. 1864, p. 542).

*P. larvatus*, var., Temm. Esq. Zool. p. 120(!); Monogr. ii.

*Hab.* Nepal (Hodgson).



This species is only known from a skin without any skull, and in a very bad state.

### 13. ARCTOGALE.

Head conical. Nose compressed, flat, and with a central groove beneath. Whiskers slender, very long, brown. Ears rounded, covered with short hair. Toes 5/5; claws short, retractile. Soles of hind feet broad, bald nearly to the heel. Tail elongate, slender, subcylindrical. The frenum covered with hair. Teeth 40.

*Arctogale*, *Peters, Handb. für Zool.* p. 98 (ined.); *Gray, P. Z. S.* 1864, p. 542.

Skull elongate. Nose produced. Brain-case rather wide, but constricted and subcylindrical in front. Forehead broad, angular behind, and extending beyond the back edge of the orbits. The orbits nearly complete behind, there being an elongated slender process from the side of the forehead, and a well-marked angle on the upper edge of the zygomatic arch. Hinder part of the palate very narrow, with a deep notch on each side in front, on a level with the hinder tubercular; front of palate as wide as two-thirds its length. Teeth small; the flesh-tooth triangular, with a long, narrow internal lobe; tubercular grinders oblong, the first nearly as long as broad.

"I have formed this into a genus, on account of the smallness of the teeth and the protraction of the palate."—*Peters's Letter*, Nov. 11, 1864. I had already distinguished the genus, but gladly adopt Dr. Peters's unpublished name to prevent the useless increase of generic names.

#### *Arctogale trivirgata*.

B.M.

Blackish brown, slightly silvered with the pale tips to the hairs; back with three narrow black streaks; throat, chest, and undersides dirty white; the head and tail black; feet blackish brown.

*Paguma trivirgata*, *Gray, Cat. Mamm. B. M.* p. 55; *Temm. Monogr.* ii. p. 335, t. 53. f. 1 (skeleton).

*Viverra trivirgata*, *Reinhardt, in Mus. Leyden.*

*Paradoxurus trivirgatus*, *Gray, P. Z. S.* 1832, p. 67; *Temm. Esq. Zool.* p. 120.

*Paradoxurus laevidens*, *vide Parzudaki's MS.*

*Arctogale trivirgata*, *Gray, P. Z. S.* 1864, p. 543.

*Hab.* Java and Sumatra (*Temm.*); Malacca (*Finlayson*); Tenasserim (*Blyth*).

The black streak varies in distinctness and length in the different specimens, being sometimes very black and extending from the back of the head to the base of the tail, in others only distinctly visible in the middle of the back. The head and end of the tail are always blacker, and the throat whitish. There is no white spot under or above the eye; so that it cannot be *Viverra hermaphrodita* of Pallas, which is described as having three dorsal streaks; and I cannot observe any baldness of the frenum in the stuffed specimens. The tail in some lights looks as if it were very obscurely marked



with narrow blackish rings; but they are not distinctly defined in any light.

The Museum procured a young specimen from M. Parzudaki, of Paris, under the name of "*P. levidens*, inter *P. larvatum* et *P. Grayi intermedius*, Ceylon." The habitat and the affinities are mistakes.

*Species of this group requiring further examination.*

**PARADOXURUS STIGMATICUS**, Temm. Esq. Zool. p. 120. Fur short and smooth; that of the nape, upper part of the body, the sides, the four members, and the tail is red-brown, with a silvery lustre; the silky hairs of all parts are tipped with yellowish white. Head black-brown, with a fulvous lustre; a pure-white longitudinal band extends from the forehead to the origin of the muffle, covering the ridge of the nose; the ears naked externally, with the base of the inner side hairy. The tail and the end of the tail chocolate. Length of head and body 17 inches, tail 19 inches.—*Hab.* Borneo (*Schwaner, Temm., Mus. Leyden*).—A single, very old, male specimen. Size and form of *P. trivirgatus*.

**PARADOXURUS LEUCOTIS**, Blyth, in Horsf. Cat. India House Mus. p. 66. Fur rather long, soft, silky; of upper part of the body, neck, head, and two-thirds of the tail tawny, becoming reddish brown on the back and sides; thighs and legs, throat and abdomen, lighter; tail very long, and deep chestnut-brown; whiskers long, blackish brown; nose with a central white line; ears scarcely covered with scattered yellowish hairs.—*Hab.* Tenasserim, Arracan (*Mus. India*).

**PARADOXURUS STRICTUS**, Hodgson, Ann. & Mag. Nat. Hist. 1855, xvi. p. 105. General colour grey, with a slight rusty shade; two prominent white spots on each side of the head, one beneath the eye oblong, tending forward, one behind the eye larger, triangular, tending backward; five continuous stripes, regularly defined and straight, of a deep black colour, commencing on the neck, extend over the whole length of the body, having on each side beneath an interrupted band of black spots. Abdomen grey. Tail exceeding the body in length; mixed grey and black at the base; the terminal portion black, the colour increasing in deepness towards the extremity. Legs black. Throat grey, with a medial black stripe. Ears developed. Length from the snout to the root of the tail 23 inches, of the tail 25 inches.—*Hab.* India.

**PARADOXURUS QUADRIScriptus**, Hodgson, Ann. & Mag. Nat. Hist. 1855, xvi. p. 106; Gray, P. Z. S. 1853, p. 191. General colour grey, with a slight rufous shade extending over the whole of the body, over one-half of the tail, over the forehead and the lower part of the ear. On the back and parts adjoining, four well-defined continuous black stripes pass from the neck to the rump, having a shorter interrupted band on each side. The bridge of the nose in the middle, a well-defined narrow streak from the canthus of the eye, the neck, the feet, and the terminal part of the tail are black; on the upper part of the neck the hairy covering is slightly variegated

black and grey, the separate hairs being grey at the base and black at the tip. The fur is soft, lengthened, and straggling. The entire length of this species is 50 inches, 26 of which are occupied by the head and body, and 24 by the tail. I could not discover any external differences between the specimens which Mr. Hodgson sent, under the name of *P. quadriscipus*, from Nepal, and *P. musanga* (see Proc. Zool. Soc. 1853, p. 191). The skull has not been compared.

*PARADOXURUS PREHENSILIS*, Gray, P. Z. S. 1832, ii. p. 66; Illust. Ind. Zool.; P. Z. S. 1864, p. 543.

*Ichneumon prehensilis*, Hamilton, MS. India House.

*Viverra prehensilis*, De Blainv. in Desm. Mamm. p. 208.

*Hab.* India.—The species, which has only been described from Dr. Buchanan Hamilton's drawing, copied in my 'Indian Zoology,' has not yet occurred to me. M. Temminck, who never could have seen it, states it to be "a constant variety" of *Paradoxurus musanga* (Esq. Zool. p. 120); but, as far as I know, *P. musanga* is confined to the Malay Islands\*.

*PARADOXURUS FINLAYSONII*, Gray, P. Z. S. 1832, p. 68, from Mr. Finlayson's drawing in Library of E. India Company; Horsfield, Cat. India House Mus. p. 65.—*Hab.* Malacca (*Finlayson's drawing*).—Probably the same as *P. musanga*.

*PARADOXURUS CRASSICEPS*, Pucheran, Rev. et Mag. Zool. vii. p. 392; Arch. für Naturg. 1856, p. 43.

*PARADOXURUS ANNULATUS*, Wagner, in Schreber's Säugeth. Suppl. ii. p. 253; Schinz, Syn. Mamm. i. p. 386. "*P. supra niger fulvo mixtus, subtus ferrugineus, lutescens; cauda nigro annulata, auriculis dense pilosis.*"—*Hab.* —? (*Mus. Munich*).

\* M. De Blainville paid a visit to Dr. Leach in 1816. I accompanied him to the College of Surgeons and the India House, where he was shown the drawings of Buchanan Hamilton. He took notes of these drawings, and on his return he published a paper in the Bull. Soc. Philom. for 1816, which he was then editing, describing:—

1. *Viverra prehensilis*, from *Ichneumon prehensilis*, Ham. MS.
2. *Cervus niger*, Ham. MS. (By a mistake, he says the drawing of the animal is in the British Museum.)
3. *Capra ægagnus cogrus*, from *C. ægagnus cogria*, Ham. MS. n. 202.
4. *Capra ægagnus imberbis*, from *C. imberbis barbara*, Ham. MS., and *C. ægagnus chaigra*, Ham. MS.
5. *Antilope quadricornis*, Ham. MS., of which he mistook the habitat, "Hoornadabad," for the Indian name of the animal.



## Fam. 5. CYNOGALIDÆ.

Head elongate, face produced. Nose rather produced; underside convex, hairy, without any central longitudinal groove. Fur very dense, close, erect, soft, and elastic. Tail cylindrical, short. Toes short, covered with dense hairs, slightly webbed at the base; the claws short, compressed, retractile; the soles of the hind feet broad, bald for about one-third of their length, the heels hairy. Frenum covered with hair. Skull—orbis only slightly defined above.

Viverridæ, tribe Cynogalina, *Gray, P. Z. S.* 1864, p. 521.

## CYNOGALE.

Head elongate. Nose broad, swollen; underside hairy, without any central groove. Ears small, rounded, covered with short hairs. Whiskers rigid, elongate; a tuft of longer, more rigid hairs under the ears and over the eyes. Tail much shorter than the body, cylindrical, covered with short hair like that on the body. Frenum covered with hair. Skull elongate; face much produced, compressed; orbits not defined at all behind, confluent with the zygomatic cavity; zygomatic arches strong; forehead between the orbits very narrow. Teeth 40; canines compressed; false grinders compressed, 3 on each side in each jaw, third without any inner lobe; flesh-tooth triangular, largely tubercular, nearly as wide as the length of the outer edge; inner lobe very large, rounded on the middle of the inner side; tubercular grinders two on each side in each jaw, large, rounded on the inner edge, rather wider than the length of the outer edge, the hinder one smaller, but similar to the front one in shape.

Cynogale, *Gray, Mag. Nat. Hist.* 1836, i. p. 579; *P. Z. S.* 1836, p. 86; 1864, p. 522 (not *Du Chaillu*).

Lamictis, *De Blainville, Comptes Rendus*, 1837, p. 56.

Potamophilus, *S. Müller, Zoog. Ind. Arch.* p. 103 (1839).

*Cynogale velox*, *Du Chaillu*, is an insectivorous mammal.

## Cynogale Bennettii.

B.M.

Cynogale Bennettii, *Gray, Mag. N. H.* i. p. 579 (1836); *Proc. Zool. Soc.* 1836, p. 86; *Eydoux & Soul. Voy. Bonite*, t.

Viverra lamictis carcharias, *Jourdan, Ann. Sci. Nat.* viii. p. 281, t. 8 a (1837); *Blainville Ann. Sci. Nat.* xiii.; *Ostéograph.* t. 12 (teeth).

Potamophilus barbatus, *S. Müller, Zoog. Ind. Archipel*, t. 17.

Cynogale barbata, *Schinz, Syn. Mam.* i. p. 388.

*Hab.* Borneo (*Honeywood*).

Skull—length  $4\frac{3}{4}$  inches; nose 1 inch 10 lines; width of the brain-case 1 inch  $4\frac{1}{2}$  lines, of zygomatic arch  $2\frac{1}{2}$  lines.



## Fam. 6. MUSTELIDÆ.

Head elongate. Nose simple, undersurface fluted, with a central longitudinal groove. Tubercular grinders one on each side of upper and under jaws. Feet rounded; the toes short, curved, more or less united by a web at the base, the last joint bent up; the claws short, compressed, acute, retractile.

Mustelidæ, § Acanthopoda, Gray, *P. Z. S.* 1865, p. 100.

In my paper describing some little-known Mammalia, in the first volume of Charlesworth's 'Magazine of Natural History,' p. 579, published in 1837, I used the forms and number of the pads on the feet of *Mephitis* to divide it into three genera, and also showed the importance of observing the size of the bald parts of the soles of the feet in distinguishing the species of Otters; and in the 'Proceedings of the Zoological Society' for 1864 I have used the excellent character which the form of the bald part of the sole affords for the separation of the genera of *Viverridæ*.

The only naturalist who seems to have followed up the subject is Mr. Hodgson, who, in his paper "On the Tibetan Badger" in the 'Journal of the Asiatic Society of Bengal' for 1847, has given, in t. 31, figures of the under part of the feet, showing the form and disposition of the pads, of eight species of Indian *Viverridæ*, *Mustelidæ*, and *Ursidæ*.

*Synopsis of the Genera.*

Tribe 1. **Mustelina.** Head oblong. Toes slightly webbed. Tail cylindrical. Terrestrial.

A. Digitigrade. Soles of the hind feet hairy, with four bald pads in front. Body elongate; anal glands developed. Tail slender; tubercular grinder short, transverse.

\* Teeth 38.

1. **MARTES.** False grinders  $\frac{3}{4}$ . Head elongate. Feet very hairy; space between the pads hairy, the hairs often covering them from sight.

\*\* Teeth 34.

2. **PUTORIUS.** False grinders  $\frac{2}{3}$ . Head short, ovate. Feet and space between the pads very hairy. Body stout; underside blackish.
3. **MUSTELA.** False grinders  $\frac{2}{3}$ . Head elongate, narrow. Feet—space between the pads very hairy. Body slender; underside yellow or white.
4. **VISON.** False grinders  $\frac{2}{3}$ . Head elongate, narrow. Feet slightly hairy; pads exposed. Body rather slender; underside same colour as upper.

5. **GYMNOFUS.** False grinders  $\frac{2}{3}$ . Head elongate, narrow. Feet rather naked, bald beneath, between, and rather behind the pads; toes largely webbed. Soles hairy behind. Body slender.
- B. Subplantigrade. *Soles and between the pads hairy. Body stout. Tail short, bushy. Anal glands none. False grinders  $\frac{3}{4}$ .*
6. **GULO.** Tubercular grinder oblong, transverse; flesh-tooth elongate, with a small subanterior inner lobe.
- C. Plantigrade. *Soles of hind feet bald, callous. Body elongate. Anal glands distinct. False grinders  $\frac{3}{4}$ ; tubercular grinder oblong, transverse.*
7. **GALERA.** Tail elongate. Soles of hind feet with a central longitudinal depression behind, and obscurely divided into four large pads in front. Heels hairy.
8. **GRISONIA.** Tail short. Body slender.

Tribe 2. **Lutrina.** Head depressed. Feet normal, rounded; toes webbed. Tail thick, tapering, depressed. Tubercular grinder oblong, transverse.

A. *Tail conical, tapering, entirely covered with hair.*

† *The palms and soles of the feet bald between the pads.*

\* *The muzzle hairy; only the thin margin of the nostrils bald.*

9. **BARANGIA.** Claws rudimentary, blunt. Toes rather elongate.

\*\* *The muzzle hairy between the nostrils; upper and front edge of the nostrils bald.*

10. **LONTRA.** Toes rather elongate, well webbed; claws sharp.

\*\*\* *The muzzle bald, band-like between the front and upper edge of the nostrils.*

† *Foot oblong; toes thick, webbed to the claws, sharply clawed; pads of toes and palm large, close together.*

11. **LUTRA.** Orbit of skull defined by a conical process behind. Head and skull elongate.

12. **NUTRIA.** Orbit of skull defined by a conical process behind. Head and skull short, broad.

13. **LUTRONECTES.** Orbit of skull scarcely defined behind. Claws acute, strong. Head and skull elongate.

\* †† *Foot oblong; toes rather slender, free at the end, bluntly or imperfectly clawed; pad of palm large, of toes slender, separated.*

14. **AONYX.** Orbit defined behind. Skull broad, depressed.

†† *The palms and soles of the feet slightly hairy between the pads; the two inner hinder toes with a band of hair on the inner side of the under surface. Muzzle bald, transverse.*

15. **HYDROGALE.** Claws acute. Skull elongate; orbits not defined behind, without any superior orbital prominence. Hind feet elongate. Toes slender, broadly webbed.

††† *Palms and soles of feet hairy between the pads. Muzzle bald between the nostrils, and produced into an angle on the upper edge.*

16. **LATAX.**

B. *Tail conical, elongate, rather depressed, covered with hair, and with a raised rounded ridge on each side.*

17. **PTERONURA.**

Tribe 3. **Enhydrina.** Head depressed. Feet large, elongate, rather fin-like, hairy above and below. Tail short, cylindrical. Grinders massive, flat-crowned.

18. **ENHYDRIS.**

### Tribe I. MUSTELINA.

Head oblong. Toes slightly webbed. Tail cylindrical. Habits terrestrial or arboreal.

*Mustelina, Gray, Ann. Phil. 1825; P. Z. S. 1865, p. 103.*

*Martinae, Burmeister, Baird, N. A. M. p. 148.*

A. *Digitigrade. Soles of the hind feet hairy, with four bald pads in front. Body elongate. Anal glands developed. Tail slender. Tubercular grinder short, transverse.*

### 1. MARTES.

Teeth 38; false grinders  $\frac{3}{4}$ . Head elongate; feet very hairy; space between the pads covered; the hair of the feet is elongate, and more or less completely covers the bald pads at the base of the toes, and hides the toes and claws, especially during the cold weather.

*Martes, Cuvier; Gray, L. M. B. M. xx. p. 63; P. Z. S. 1865, p. 104; Nilsson, Skand. Fauna, p. 166.*

a. *Skull elongate, narrow, with the nose rather produced.*

\* *Tail moderate, not so long as the body and head, bushy. Martes.*

† *The hinder upper tubercular grinder large, massive, nearly twice as long on the inner as on the outer side.*

#### 1. **Martes abietum.** (Pine-Marten.)

B.M.

Brown; throat yellow or yellow-spotted.

*Mustela martes, Linn. S. N. p. 167; Keyserl. & Blas. W. E. i. p. 67; Pallas, Zoogr. i. p. 85; Bonap. Faun. Ital. t. 3; Brandt, Zobel, t. 3; Middendorff, N. u. O. Sib. Säugeth. p. 69, t. 2. f. 1, 6.*



*Martes abietum*, Ray; Gray, *List M. B. M.* p. 63; *P. Z. S.* 1865, p. 104.

Var. 1. *vulgaris*. Dark brown; throat yellow.

*Martes vulgaris*, Gray.

Pine-Marten, *Penn. B. Z. i.* p. 97.

Var. 2. *martes*, Brandt, Zobel.

*Martes sylvestris*, Gesner, *Quad.* p. 867, f. 866; Nilsson, *Skand. Fauna*, p. 171.

*Martes sylvatica*, Nilss. *Sk. Faun. i.* p. 41.

Length 18 inches, tail 10.

*Hab.* Europe: England and France, B.M.; Russia, B.M.

Var. 3. *altaica*. Paler; nose and feet brown, tail dark, throat and chest yellow. Intermediate between *M. abietum* and *M. zibellina*; but the feet are not so hairy. Skull and teeth like *Martes abietum vulgaris*. B.M.

*Martes altaica*, Pallas, *Zoogr. Ross.-Asiat.*

*Hab.* Altai Mountains.

## 2. *Martes japonica*.

B.M.

Brown; shoulder and outside of thigh blacker; feet black; head, chin, and upper part of throat dark red-brown; throat and sides of the neck yellow, crown paler; the last upper tubercular grinder longer on the inner side.

*Martes japonica*, Gray, *P. Z. S.* 1865, p. 104.

*Hab.* Japan. From Mus. Leyden?

The specimen is not in a good state; the fur is evidently in change, the tail being slender, with a long terminal pencil. It is most distinct from the specimen of *M. melanopus*. In the Museum collection the upper tubercular grinder is smaller than in the *M. abietum*, and is much larger than in *M. americana*.

There is an indistinct patch of paler hairs in the front of the ear, on the left side, not seen on the other; the pale brown on the chest is marked with some small dark spots on the lower part. The skull, and especially the brain-case, is broader, compared with its length, than that of *Martes abietum* and *M. zibellina*, and is intermediate in form between them and *M. foina*.

## 3. *Martes brachyura*. (Gezolen.)

Fur short, fine, close, pale brown; tail short; ears small, rounded, whitish; feet very hairy.

Length, body 16-17 inches, tail  $3\frac{1}{2}$  inches.

*Mustela brachyura*, Temm. *Fauna Japon.* p. 33; Schrenck, *Amurland*, p. 32.

*Martes brachyura*, Gray, *P. Z. S.* 1865, p. 105.

*Hab.* Japan, near Zezo, and the Kurile Islands (Siebold).

Described from flat skins in Mus. Leyden.

4. *Martes melanopus*. (Japanese Sable.) B.M.

Fur soft, yellow-brown; underside scarcely paler; orbit, and streak from orbit to nose, and feet blackish; crown of head paler; sides of nose, cheeks, and throat white.

*Martes* (*Melampus*) *melanopus*, *Gray, List Mam. B. M.* p. 63; *P. Z. S.* 1865, p. 105; *Gerrard, Cat. Bones B. M.* p. 91.

*Mustela melanopus*, *Temm. Fauna Japon.* p. 31, t. 7. f. 3, 4 (animal and skull).

*Hab.* Japan.

5. *Martes zibellina*, Linn. (Sable.) B.M.

Fur very soft, black, grey, or yellow-brown; throat like back, or paler yellowish or whitish; feet very hairy. Skull and the hinder upper grinders, according to M. de Blainville's figure, are like those of *M. abietum vulgare*.

*Mustela zibellina*, var. *alba* and *fulvo-flavescens*, *Brandt, Zobel*, t. 2. f. 5, 6.

*Mustela zibellina*, *Linn.*; *Pall. Spic. Zool.*; *Blainv. Ostéogr.* t. 7 (skull), t. 13. f. (teeth); *Schrenck, Amurland*, p. 27; *Middendorff, N. u. O. Sib. Säugeth.* p. 68, t. 2. f. 1, 2, 3, 5 (pelvis and tail).

*Mustela zibellina*, var. *rossica*, *Brandt*.

*Martes zibellina*, *Brisson*.

*Viverra zibellina*, *Shaw*.

*Zibeline*, *Buffon, H. N.*

*Sable*, *Penn.*; *Bennett, Garden and Menag.*

*Martes zibellina*, *Gray, P. Z. S.* 1865, p. 105.

a. Fur blackish, with a few white scattered hairs; under-fur lead-colour; head and chin greyish, grizzled with pale grizzly hairs. B.M.

*Mustela zibellina asiatica*, *Brandt, Zobel*, t. 1.

b. Fur blackish, with many white hairs; under-fur whitish; orbit, cheeks, throat, and chest whitish. B.M.

*Mustela zibellina asiatica rupestris*, *Brandt, Zobel*, t. 2. f.

c. Yellow-brown; under-fur yellowish white; head, upper parts of body, neck, throat, and chest whitish; legs, feet, and tail darker. B.M.

*Mustela zibellina asiatica*, *Brandt, Zobel*, t. 2. f. 4.

d. Yellowish brown; under-fur of same colour; ears and cheeks whitish; tail dusky, darker; feet blackish. B.M.

*Mustela zibellina sylvestris*, *Brandt, Zobel*, t. 2. f. 4.

e. Fur whitish or white.

*Hab.* North Europe, Asia.

Middendorff (*Säugeth. N. u. O. Sib.* t. 2) figures the pelvis and tail of *M. zibellina* and *M. martes* of Siberia; he represents the former as much shorter, and composed of thirteen, and the latter much longer and larger, and consisting of seventeen vertebræ.

†† The upper hinder tubercular grinder quadrate, rather longer on the inner than on the outer side.

6. *Martes americana*. (American Sable.) B.M.

Brown or yellow; throat yellow; ears and head grey or white; upper tubercular grinder small.

*Mustela americana*, Turton, *Syst. Anim.* i. p. 60, 1803; Baird, *Mamm. N. Amer.* t. 36. f. 2, t. 27. f. 7.

*Mustela martes*, var., J. Sabine, *Franklin's Voyage*; Richardson, *F. B.-Amer.*

? *Mustela vulpina*, Rafinesque, *Silliman's Amer. Journ. Sci.* i. (tip of tail white).

*Mustela zibellina*, var. *americana*, Brandt, *Zobel.*

*Mustela leucopus*, Gerrard, *Cat. Bones B. M.* p. 91.

*Martes americana*, Gray, *P. Z. S.* 1868, p. 106.

Var. 1. *abietinoides*. Black-brown; ears pale; head grizzled with white hairs, more or less grey; throat yellow or yellow-spotted; throat-spot large or broken up into small spots; the head sometimes with only a few grey hairs, and the throat with only a few distinct small spots. B.M.

? *Martes vulpina*, Rafinesque.

Hab. Rocky Mountains (Drummond & Lord).

Var. 2. *huro*. Yellow-brown; head and ears whitish; throat pale yellow; legs, feet, and tail blackish. B.M.

*Mustela huro*, F. Cuvier, *Dict. Sci. Nat.* xxix. p. 356; Richardson, *Zool. Beechey's Voyage.*

Marten of Hudson's Fur-list.

Sable of American traders.

Hab. Fort Franklin.

Var. 3. *leucopus*. The head, neck, and chest more white; legs yellow; feet white at the tip. B.M.

*Mustela leucopus*, Kuhl, *Beitr.* p. 70.

*Mustela leucotis*, Griffith's *An. K.* ii. p. 270, t. (misprint?).

M. Brandt observes, "I can find no difference between the Asiatic and American Sables in the characters of the head, ears, tail, or feet; and as, even in respect to colour, the Sable of the Nischnaga Tunzusta, sent home by Middendorff, occupies an intermediate position between the dark Asiatic and the yellow American Sables, I am induced to consider the American animal rather as a yellowish or mere yellow-brown and less densely furred variety of the Asiatic Sable than as a distinct species or as a pure Marten (*Mustela martes*)."—*Beitr. Säugth. Russland*, 1855.

Dr. Baird observes, "I am myself, however, far from admitting the identity of the American Marten with the Russian Sable, although it occupies a position intermediate between the latter and *M. martes* in size, length of tail, and coloration as well as intrinsic value of fur. The white-headed varieties of New York are most like the Sable, and



the dark-headed one of the western country like the Pine-Marten. I have never seen winter specimens of the latter, nor summer of the former, and am inclined to believe that all may exhibit more white on the head in winter than in summer."—*Baird, l. c.* p. 157.

It is curious that both Brandt and Baird seem to have overlooked the small size of the last tubercular grinder, which separates the American from the Old-World Pine-Martens.

The brain-case in the skull of the American specimen we have in the Museum is very thin, and so closely applied to the brain that it shows its convolutions on the outer surface; but this is not shown in the American skull figured by Dr. Spencer Baird. The same is to be observed in the Altaic specimen of *M. abietum*.

There is a series of specimens of the American Pine-Marten in the British Museum, collected by Dr. Lord during his excursion with the Boundary Commissioners. They vary greatly in colour, from pale brown to nearly black; and the throat is variously mottled with yellow.

The specimens from Russia have whitish heads, like the *M. leucopus* of Kuhl.

The stuffed Sables from Russia have short tails; but the tail of one of Dr. Lord's is almost as short: the tail seems to vary in length; but this may depend on the skinning, and, in the stuffed skins, on the preparation of the animals.

\*\* Tail elongate, slender; skull elongate, narrow; nose produced; upper tubercular grinder massive, broader on the inner side. Pekania.

#### 7. *Martes Pennantii*. (The Wood-Shock.) B.M.

Black; head, nape, and front of back greyish; tail elongate. The last upper tubercular grinder is large and massive, like that of the European Pine-Marten (*M. abietum*).

*Mustela Pennantii*, *Erxl. Anim.* p. 79, 1777; *Baird, Mamm. N. A.* p. 149, t. 36. f. 1 (skull).

*Mustela canadensis*, *Schreb. Säugeth.* p. 492, t. 134, 1778; *Blainv. Ostéogr.* *Mustela*, t. 13. f. (teeth).

*Mustela melanorhyncha*, *Bodd. Elen. Anim.* p. 188, 1784.

*Viverra canadensis*, *Shaw, Zool. i.* p. 492, 1800.

*Mustela nigra*, *Turton, S. N. i.* p. 60, 1806.

*Mustela piscatoria*, *Lesson.*

*Viverra piscator*, *Shaw, Zool. i.* p. 414, 1800.

*Mustela Goodmanii*, *Fischer, Syn. Mamm.* p. 217, 1829.

*Gulo castaneus*, *H. Smith.*

*Gulo ferrugineus*, *H. Smith.*

*Martes canadensis*, *Gray, Cat. M. B. M.* p. 63; *Gerrard, Cat. Bones B. M.* p. 91.

*Martes Pennantii*, *Gray, P. Z. S.* 1865, p. 107.

*Fisher, Penn. Quad.* p. 223.

*Wejack, Hearne.*

Wood-Shock, *Hudson's Bay Comp. List.*

Pekan (*Canadians*), *Buff. H. N.* xiii. t. 42.

Pekan Weasel, *Penn. Quad.* p. 202, 1781.

Black Fox, *Lewis & Clark.*

- b. *Skull swollen, flattened; nose short; upper cutting-teeth erect; tail moderate, not so long as body; subcylindrical.* Foina.

8. *Martes foina.* (Beech-Marten.) B.M.

Black-brown; throat white. The tubercular grinder is large, massive, narrow on the inner side, as in the *M. abietum*, but not quite so large as compared with the other teeth.

The pad of the soles always exposed (*Baird*).

*Mustela martes*, var. *fagorum*, *Linn. S. N. i.* p. 67.

*Mustela foina*, *Brisson. R. A.* p. 246; *Keyserl. & Blas. W. E. i.* p. 67; *Blainv. Osteogr.* *Mustela*, t. 4 (skeleton), t. 13. f. (teeth).

*Martes fagorum*, *Ray*.

*Martes domestica*, *Gesner*.

*Martes foina*, *Nilsson, Skand. Fauna*, p. 167; *Gray, P. Z. S.* 1865, p. 108; *Gerrard, Cat. Bones B. M.* p. 191.

*Fouine, Buffon, H. N. vii.* t. 18-21.

*Hab.* Europe and Eastern Asia, in houses (England, France).

- c. *Skull swollen, flattened; nose short, broad; upper cutting-teeth projecting; tail elongate, slender.* Charronia.

9. *Martes flavigula.* (White-cheeked Weasel.) B.M.

Yellowish; head, nape, rump, legs, and tail black; chin and lower parts white. The tubercular grinder is moderate-sized, transverse, scarcely larger on the inner side; but this is larger, compared with its breadth, than that of the *Martes americana*.

*Mustela flavigula*, *Bodd.*

*Mustela Hardwickii*, *Horsf. Zool. Journ.* iv. t. 8.

*Viverra quadricolor*, *Shaw, Zool.*

*Mustela leucotis*, *H. Smith, in Griffith's A. K. t.*

*Martes Gwatkinsii*, *P. Z. S.* 1858, p. 516.

*Mustela lasiotis*, *Temm.*

*Martes flavigula*, *Hodgson, P. Z. S.* 1856, p. 398; 1858, p. 516; *Gray, Cat. Mamm. B. M.* p. 64; *P. Z. S.* 1865, p. 108.

*Martes Elliottii*, *Mus. E. Ind. Company.*

*Hab.* Nepal Hills.

See *Mustela martes Henricii*, *Westermann, Bijdrag. tot de Dierk.* p. 13, t. ?

*Hab.* Java, Sumatra, Borneo.

	<i>Martes abietum.</i>	<i>Martes leucopus.</i>	<i>Martes melanopus.</i>	<i>Martes foina.</i>	<i>Martes flavigula.</i>	<i>Martes canadensis.</i>
Length of skull .....	in. 1. 3 6	in. 1. 2 10	in. 1. 3 1	in. 1. 3 1	in. 1. 3 4½	in. 1. 4 0
— nose from front of orbit	1 0	0 9	0 10½	0 10½	0 10	1 1
— palate .....	1 9½	1 5	1 7	1 6½	1 7	2 0
— tooth-line from front of canine .....	1 3	1 0	1 0	1 2	1 1	1 6
— lower jaw .....	2 3	1 7½	2 0	1 11	2 0	2 7
— width over ears .....	1 4	1 2½	1 6	1 6	1 8	1 7½
— of nose in front of orbit	0 10½	0 8	0 9	0 9½	0 10½	0 11

## 2. PUTORIUS.

Skull short, ventricose; teeth 34, false grinders  $\frac{2}{3}$ ; the upper tubercular grinder small, transverse, scarcely larger on the inner than on the outer side; head short, ovate; feet hairy, space between the pads very hairy; body stout; underside blackish.

Putorius, *Cuvier*; *Gray*, *Cat. M. B. M.* xx. p. 64; *P. Z. S.* 1865, p. 108.

Fœtorius, *Keys. & Blas.*

Mustela putorius, *Nilsson*, *Skand. Fauna*, p. 147.

\* *Back uniform.*

## 1. Putorius fœtidus. (Polecat.)

B.M.

Fur harsh, rigid, brown; skull scarcely contracted behind the orbits; orbits small; feet and tail black; mouth and ears whitish.

Mustela putorius, *Linn. S. N.* p. 167; *Pallas*, *Zoogr.* i. p. 37; *Nilsson*, *Skand. Faun.* p. 148; *Illum. Fig.* t. 30; *Blainv. Ostéogr.* Mustela, t. 4 (skeleton), t. 7 (skull), t. 13 (teeth).

Mustela fœtida, *Klein.*

Putorius typus, *F. Cuvier.*

Putorius communis, *Cuvier, R. A.*

Putorius vulgaris, *Gray*; *Owen*, *Brit. Foss. Mamm.* p. 122, f. 38, 39 (skull).

Putorius fœtidus, *Gray*, *List Mamm. B. M.* p. 64; *P. Z. S.* 1865, p. 108.

Fitchet Weasel, *Penn. B. Z.* p. 136.

Var. 1. *furo*. More or less albino; eyes red.

Mustela furo, *Linn.*

Furet, *Buff. H. N.* vii. t. 26, 27, 28, 29.

Var. 2. *subfuro*, Polecat-Ferret. Yellow; the legs, tail, toes, and tips of the hairs black; head white. Bred from two yellow Ferrets. (*Saffron Walden Museum.*)

Le Furet putoire, *Buff. H. N. Supp.* t. 27.

The skulls vary considerably in the width and depression of the brain-case; but they are never suddenly contracted in front behind the orbit, as the skull of *P. Eversmannii*.

## 2. Putorius Eversmannii.

B.M.

Fur soft, black-brown, in winter whitish or yellowish, hairs of back black-tipped; limbs short; the thighs and end of the tail black; the skull broad; brain-case suddenly and strongly contracted in front behind the orbits; orbits large.

Mustela putorius, var., *Pall. Z. R.-A.* p. 89.

Mustela Eversmannii, *Less. Man.*; *Nordm. Faun. Pont.* p. 16.

Mustela putorius, var. sibirica, *Fischer, Syn. Mamm.*

Mustela putorius, *Blyth, J. A. S. B.* xi. p. 281.



*Mustela putorius tibetanus*, *Hodgson, J. A. S. Beng.* xxiii. p. 446, 1849, i.; *Horsf. Cat. Mus. I. H.* p. 103; *P. Z. S.* 1856, p. 398.

*Putorius Eversmannii*, *Gray, P. Z. S.* 1865, p. 109.

*Hab.* Siberia (*Pallas*), B.M.; Thibet (*Hodgson*), B.M.

The skull is considerably larger than that of the *Putorius fœtidus*.

### 3. ? *Putorius nigripes*.

Yellowish brown above, below white; forehead, feet, and end of tail black. Tail and hair at end one-third the length of body and head; length 19 inches, tail  $5\frac{1}{2}$  inches.

*Putorius nigripes*, *Aud. & Bachm. N. A. Quad.* ii. p. 297, t. 93; *Baird, N. A. Mamm.* p. 180; *Gray, P. Z. S.* 1865, p. 109.

*Hab.* North America, Platte region. Not seen by Dr. Spencer Baird.

\*\* *Back spotted or mottled.*

### 4. *Putorius sarmaticus*. (Vormela, or Peregusna.) B.M.

Fur soft, brown and yellow, varied above; head, belly, feet, and tip of tail deep black; frontal band and ears white.

*Mustela sarmatica*, *Pallas, Spic. Zool.* xix. t. 41.

*Mustela peregusna*, *Guld.*

*Mustela præcincta*, *Ranz.*

*Putorius sarmaticus*, *Gray, List Mamm. B. M.* p. 64; *P. Z. S.* 1865, p. 110.

*Hab.* Russia.

## 3. MUSTELA.

The body elongate, slender. Limbs short; feet moderate; toes moderate, slightly webbed, covered with hair; space between the pads hairy. Tail elongate, slender, subcylindrical, covered with elongate hairs.

Skull elongate, depressed; teeth 34; præmolars  $\frac{2}{3}$ .  $\frac{2}{3}$ ; upper tubercular grinder transverse, scarcely longer on the inner edge.

Fur dark above, white or yellow beneath.

*Mustela*, *Linn.*; *Gray, Cat. Mamm. B. M.* xx. p. 65; *P. Z. S.* 1865, p. 111.

*Mustela* (*Mustela*), *Nilsson, Skand. Fauna*, i. p. 156.

*Putorius* (partly), *Cuvier*.

*Mustela* (*Gale*), *Schinz, Syn. Mamm.* i. p. 342.

\* *Face without pale spot in front of ears.*

† *Back uniform colour; tail black-tipped.*

### 1. *Mustela erminea*. (Stoat, or Ermine.) B.M.

Brown above; upper lip, chin, and lower surface of body, inside of limbs, and feet yellowish white; tail brown, shorter than the body, end black. In winter all yellowish white; end of tail black.

*Mustela erminea*, *Linn. S. N.* i. p. 68; *Nilsson, Skand. Faun.* p. 157;

*Illum. Fig.* t. 12; *Gray, P. Z. S.* 1865, p. 111.

*Putorius erminea*, Owen, *Brit. Foss. Mamm.* p. 116, f. 40, 41, 42 (skull).

*Mustela ermineum*, Pallas, *Zoogr.* i. p. 90; *Buffon*, *H. N.* vii. t. 29. f. 2, t. 31.

Stoat or Ermine, *Penn. B. Zool.* i. pp. 89, 67, f. 18.

*Hab.* Europe, England, France; North Africa.

Var. 1. *africana*. Tail very short, black-tipped, one-sixth the length of body.

*Hab.* North Africa, Algiers.

B.M.

Var. 2. *Kaneii*.

*Putorius Kaneii*, Baird, *N. A. Mamm.* p. 172; *Arch. f. Naturg.* 1859, p. 9.

*Hab.* Kamtschatka; Tchucktchi country, Siberia.

Var. 3. *americana*. Tail more or less elongate, from one-third to one-half the length of the body.

B.M.

*Putorius noveboracensis*, Dekay, *N. Y. Zool.* i. p. 36, t. 12. fig. 2, t. 14. f. 2, 1842; Baird, *N. A. Mamm.* p. 166, t. 36. f. 3 (skull).

*Putorius ermineus*, Aud. & Bachm. *N. A. Quad.* ii. p. 56, t. 59.

*Mustela Cicognani*, Bonap. *Fauna Ital.*

*Mustela fusca*, Bachman, *Journ. A. N. S. Philad.* viii. p. 288.

*Mustela* (Gale) *fusca*, Schinz, *Syn. Mamm.* p. 243.

*Mustela vulgaris*, Thompson, *Hist. Verm.* p. 30.

*Putorius fuscus*, Aud. & Bachm. *N. A. Quad.* iii. p. 234, t. 148.

*Putorius Cicognani*, Baird, *M. N. A.* p. 161.

*Putorius longicauda*, Richardson, *Zool. Beechey*, t. 10, 1839.

*Mustela* (*Putorius*) *erminea*, var. long-tailed, Richardson, *F. B.-A.* p. 46, 1829.

*Mustela longicauda*, Bonap. *Mag. N. H.* 1838, p. 38.

*Hab.* North America, Carlton House.

B.M.

Bonaparte, Richardson, and Baird have separated the Weasels and Ermines of America and Europe into several species, on minute differences in the length of the tail as compared with the body.

Dr. Spencer Baird, in his work on the Mammals of North America, divides the Stoats into six species, by the length of the tail and the extent of the black on the tail. By his specific characters, the vertebrae of the tail in *P. Richardsonii*, *P. noveboracensis*, and *P. longicauda* are about one-half, in *P. Cicognani* one-third, in *P. ermineus* one-fifth, and in *P. Kaneii* one-sixth the length of the body.

When the bodies of several English Stoats have been compared, they show how deceptive that character is. I do not say that they may not be distinct; but, if they are, there must be other characters to separate them besides the mere length of the tail. They are spread over a large extent of country, and some of the presumed species have a large range.

The skulls of the English Weazel and Stoat are also found to be rather variable when a large series of them are compared.

They change colour when they live in a cold district, and the fur appears to become finer and denser in the more rigorous climates.

Dr. Spencer Baird described *P. noveboracensis* as having 52 ver-



tebræ, including 4 sacral and 22 caudal; while *P. ermineus* has, according to him, only 19 caudal and 3 sacral, which are the typical numbers in the genus. As this has only been observed in one skeleton, it may be only an accidental variation.

## 2. *Mustela Richardsonii*. (Richardson's Stoat.)

Dark chestnut-brown; upper lips and legs entirely brown; chin and under surface white; tail with a long black tip, depressed; distichous. In winter entirely white; tail-end black.

*Mustela Richardsonii*, *Bonap. Mag. N. Hist.* ii. p. 38; *Gray, P. Z. S.* 1865, p. 112.

*Mustela erminea*, var., *Richard. Faun. Bor.-Amer.* p. 146.

*Putorius Richardsonii*, *Richard. in Zool. Beechey's Voy.* p. 10; *Baird, Mamm. N. A.* p. 164.

*Mustela erminea*, *Thompson, Hist. Verm.* p. 31, 1842.

*Putorius agilis*, *Aud. & Bachm. N. A. Quad.* pp. 111, 184, t. 140, 1833.

*Hab.* North America: Fort Traveller (*Richardson*); from Halifax to Vancouver's Island (*Baird*).

I have not seen this species; but Dr. Spencer Baird describes it very particularly. The quantity of white on the upper lip seems to vary. There is in the British Museum an adult female Stoat from Cambridgeshire, which has only a very thin margin of white to the upper lip. In most specimens of the European and American Ermines the white on the lips is very distinct and well marked.

The specimen formerly named *M. Richardsonii*, in the British Museum, has the hinder part of the upper lip white, but the hair is bent back and lost off the front part.

## 3. *Mustela agilis*.

Reddish grey; hairs grey, with a broad yellow ring and reddish tip; tail shorter than the body, reddish grey, darker at the tip, beneath greyish white; head black, brown above, with a white border to upper lip,

Length 10 inches, tail 4, head  $1\frac{1}{2}$ .

*Mustela agilis*, *Tschudi, Fauna Peruviana*, p. 110 (not *Bachm.*); *Baird, Mamm. N. A.* p. 165; *Gray, P. Z. S.* 1865, p. 113.

*Hab.* Peru, Cordilleras.

†† *Back and tail uniformly coloured.* Gale.

## 4. *Mustela vulgaris*. (Weasel.)

B.M.

Brown; lower lip and beneath white; upper lip and tail brown; tail less than half the length of the body. Winter-fur pure white; tip of tail sometimes darker.

*Mustela vulgaris*, *Briss. R. A.* p. 241; *Erxl. M.* p. 471; *Gray, P. Z. S.* 1865, p. 113; *Blainv. Ostéogr.* *Mustela*, t. 7 (skull), t. 13 (teeth).

*Mustela gale*, *Pallas, Zoogr.* p. 194 (*albino* in winter).



*Mustela nivalis*, *Linn. Act. Suec.* vi. t. 8; *S. N.* p. 169.  
Common Weasel, *Penn. B. Z.* i. p. 951, t. 7. f. 17.

*Hab.* North Europe, North Asia, England, France (B.M.).

*Var. americana.*

B.M.

*Putorius vulgaris*, *Richardson, F. B.-A.* p. 145.  
*Putorius Cicognani*, *Richardson, Beechey's Voy.* p. 10.  
*Mustela vulgaris*, *Max. Reise*, ii. p. 98.  
*Mustela pusilla*, *Dekay, N. Y.* p. 134, t. 14. f. 1.  
*Putorius pusillus*, *Aud. & Bachm. N. A. Quad.* ii. p. 100, t. 64; *Baird, M. N. A.* p. 159.  
Common Weasel, *Penn. Arctic Zool.* p. 75; *Pr. Max. Arch. f. Nat.* 1861, p. 229.

*Hab.* North America.

### 5. *Mustela boccamela.*

B.M.

Chestnut; upper lip, inside of limbs, feet, and beneath white; tail almost half as long as the body, scarcely darker.

*Mustela boccamela*, *Bechst. Naturg. Deutschl.*; *Sundevall, K. V. Akad. Hand.* 1841, p. 215; *Blainv. Ostéogr. Mustela*, t. 13. f. (teeth); *Kuster, Isis*, 1835; *Bonap. Fauna Ital.* t.; *Gray, P. Z. S.* 1865, p. 113.

*Mustela subpalmata*, *Ehrenb. Syn. Mamm.* p. 2; *Sundevall, K. V. Akad. Hand.* 1842, p. 215.

*Mustela vulgaris*, *Rüppell.*

*Mustela erminea*, var., *Nilsson, Skand. Fauna*, p. 157.

*Boccamela*, *Cetti, Hist. Sardinie*, v.

*Hab.* South Europe, North Africa, Algiers (B.M.); Cairo (*Sundevall*).

### 6. *Mustela alpina.*

B.M.

Pale yellow-brown; upper lip, chin, and beneath yellowish white; head varied with black-tipped hairs; tail cylindrical, unicolor, not so long as the body and head.

*Mustela alpina*, *Gray, L. M. B. M.* p. 67; *P. Z. S.* 1865, p. 114.

*Mustela altaica*, *Pallas, Zoogr. Ross.-Asiat.* i. t. 98.

*Mustela gale altaica*, *Schinz, Syn. Mamm.* p. 344.

*Putorius alpinus*, *Gebler, Mém. Mosc.* vi. p. 213.

*Hab.* Altai Mountains.

Varies in the darkness of colour of the lower part of the body; in some specimens it is decidedly paler, with the line of separation well marked. In some specimens the feet are entirely covered with hair; and in others the pads are distinct, but covered with hair at the base.

††† *Back streaked.*

### 7. *Mustela albinucha.*

B.M.

Black; forehead, crown, and nape white; four stripes on the back, converging in front and behind, pale-brownish white; tail white, tapering.

*Zorilla albinucha*, Gray, *Proc. Zool. Soc.* 1864, p. 69, pl. 10.

*Mustela albinucha*, Gray, *P. Z. S.* 1865, p. 114.

*Hab.* Africa, Angola (*Sundevall, Tristram*).

This is a *Mustela* having the coloration of a *Zorilla*.

\*\* *Face with pale spot in front of ears; back uniform; tail-end black.*  
American. Neogale.

8. *Mustela brasiliensis*. (Black-faced Weasel.) B.M.

Brown; head and tip of tail blackish; spot before ears, another on centre of forehead, chin, and throat white; chest and belly yellow.

*Mustela brasiliensis*, *Sewast. Mém. Acad. Pétersb.* iv. p. 356, t. 4 (good), 1813; *Gray, P. Z. S.* 1865, p. 114.

*Mustela* (*Putorius*) *brasiliensis*, *D'Orb. Voy. Amér. Mérid.* t. 13. f. 3 (skull).

*Mustela frenata*, *Licht. Darstell. Säugeth.* t. 42; *Gray, Voy. Sulph.* t. f. 2.

*Putorius frenatus*, *Bachm. N. A. Quadr.* ii. p. 71, t. 60; *Baird, Mamm. N. A.* p. 173, t. 77. f. 1, 2 (skull).

*Mustela javanica*, &c., *Seba, Thesaur.* p. 177, t. 48. f. 4.

*Mustela erminea*, var., *Pallas, Zoogr. Ross.-Asiat.* p. 92 (from *Seba*).

*Mustela gale leucogenis*, *Schinz, Syn. Mamm.* i. p. 344 (from *Seba*).

*Var.* 1. Spot before ears and that on forehead confluent. B.M.

*Var.* 2. With a small white spot under the eyes. B.M.

In some specimens the feet are white or brown, with white toes; and in others the feet are brown-yellow.

*Hab.* Mexico, Matamoras (*Baird*); California.

*Var.* 3. *brasiliana*. Feet white; underside bright yellow. B.M.

*Hab.* Brazil.

Dr. Spencer Baird refers *M. brasiliensis*, *Sewastanoff*, to this species with great doubt, though it is a very good description, and moderate but characteristic figure.

9. *Mustela aureoventris*.

B.M.

Dark brown; head and tip of tail blacker; chin and sides of the throat white; a spot in front of ears, throat, chest, insides of fore legs, and belly golden yellow; whiskers black; tail rather tapering, as long as the body; soles of the hind feet hairy; ears rounded, hairy. Length of body and head 12, tail 8 inches.

*Var.* Fore feet brown, with one or two toes white.

*Mustela aureoventris*, *Gray, Proc. Zool. Soc.* 1864, p. 55, pl. 8 (young); 1865, p. 115; not *Mustela auriventer*, *Hodgson*.

*Hab.* Ecuador, Quito (*Gould*); New Granada (*Fraser*).

This may be a darker variety of the *M. brasiliensis*, wanting the spot on the forehead. The young from Quito is much darker than the adult; *M. xanthogenys* is intermediate as regards the spot on the head.



10. *Mustela xanthogenys*. (Yellow-cheeked Weasel.) B.M.

Brown; tip of tail black; spot before the ears, chest, and beneath yellow; a small spot under each eye and the chin white; feet white.

*Mustela xanthogenys*, Gray, *Ann. & Mag. N. H.* 1843, p. 118;  
*Zool. Voy. Sulphur*, t. 9; *P. Z. S.* 1865, p. 115.

*Putorius xanthogenys*, Baird, *Mamm. N. A.* p. 176.

*Hab.* California.

Very like *M. brasiliensis*; but the head is coloured like the back, and the spot before the ears is yellow. There is a very small white spot over the orbit on one side.

M. de Blainville (*Ostéographie*) figures the upper jaw of a *Mustela* under the name of *M. patagonica*, with small teeth and a very short brim-like transverse tubercular grinder, that is quite unknown to me, and very unlike *M. Humboldtii*, figured on the same plate.

## 4. VISON.

Body elongate, slender. Limbs stout; feet rather hairy; pads bald, exposed; space between them bald. Tail moderate, shorter than the body, hairy. Skull elongate, depressed. Teeth 34; false grinders  $\frac{3}{2}$ ; the upper tuberculated grinder rather large, inner lobe with one tubercle, outer edge with three.

*Foetorius*, *Keys. & Blas.* p. 21.

*Mustela*, § *Lutreola*, Schinz, *Syn. Mamm.* i. p. 346.

*Mustela*, § *Putorius*, Nilsson, *Skand. Faun.* p. 152.

*Putorius* (sp.), Baird.

*Vison*, Gray, *P. Z. S.* 1865, p. 115.

Body nearly as stout as that of an Otter. Very destructive in farmyards. The pads of all the toes are naked, not overgrown with hair; the soles with four pads placed at the base of the digits, the largest at the line of junction between the third and fourth digits, and well furred between the pads (Baird, p. 178). Feet in summer more naked than in winter.

a. *The upper tubercular grinder large, the inner half much larger and longer than the outer one; upper lip brown.* American Vison.

1. *Vison lutrecephala*. (American Vison.) B.M.

Brown; lower lip and chin more or less white.

*Mustela lutreola*, Foster, *Phil. Trans.* lxiii. p. 371.

*Mustela vison*, Briss.; Blainv. *Ostéogr. Mustela*, t. 13 (teeth).

*Mustela* (*Putorius*) *vison*, Richardson, *Fauna B.-A.* p. 48.

*Mustela* (*Martes*) *vison*, Desm. *Mamm.* i. p. 183, 1820.

*Mustela lutrecephala*, Harlan, *Fauna Amer.* p. 63.

*Mustela vison*, var. *americana*, Schinz, *Syn. Mamm.* p. 347.

*Mustela canadensis*, Erxl. *Syst.* i. p. 447.

*Mustela canadensis*, β. *vison*, Bodd. *Elench. Anim.* p. 186.



- Mustela winingus*, *Barton, Am. Phil. Trans.* vi. p. 70, 1809.  
*Mustela minx*, *Ord, Guthrie's Geog.* pp. 281, 298.  
*Mustela (Lutreola) vison*, *Wagn. Schreb. Suppl.* ii. p. 241.  
*Lutra vison*, *Shaw, G. Zool.* i. p. 448.  
*Putorius vison*, *Gapper, Zool. Journ.* v. p. 202; *Aud. & Bachm. N. A. Quadr.* i. p. 250, t. 33; *Baird, Mamm. N. A.* t. 37, f. 23 (skull).  
*Vison*, *Buffon, H. N.* xiii. p. 308, t. 43.  
*Vison lutrecephalus*, *Gray, P. Z. S.* 1865, p. 116.  
*Jackash*, *Hearne. Fontereau, La Hontan. Otay, Sagard. Mink, or Minx, Fur-traders, N. A.*

*Var.* 1. Darker; throat and chest not spotted.

*Hab.* Vancouver's Island (*Dr. Lord*). B.M.

*Var.* 2. Chin entirely brown. B.M.

*Var.* 3. Small; darker.

*Putorius nigrescens*, *Baird, Mamm. N. A.* 180; *Aud. & Bachm. N. A. Quadr.* 2nd edit. iii. 104, t. 124.

*Hab.* North America.

This animal has been confounded with *Mustela lutreola*, which is at once known from the *Vison* by the white spot on the side of the nose and the size of the tubercular tooth.

Dr. Spencer Baird thinks that the *Mustela rufa* of Ham. Smith (*Jardine, Nat. Libr. Mamm.* xiii. p. 189) is intended either for the *Vison* or the Pine-Marten (see *Mamm. N. A.* p. 177).

b. *The upper tubercular grinder small, transverse, the inner half scarcely larger than the outer; upper lip white in front.* Old-World. *Lutreola*.

## 2. *Vison lutreola.* (Mank, Nurec.) B.M.

Black-brown; tail-end blacker; spot on side of nose, on upper lip, and chin white.

- Mustela lutreola*, *Linn. S. N.* i. p. 66; *Pallas, Spic. Zool.* xiv. p. 46, t. 8, f. 1.  
*Viverra lutreola*, *Linn. Faun. Suec.* p. 5.  
*Lutra lutreola*, *Shaw; Gloger, N. Act. Acad. N. Cur.* xiii. p. 501; *Baird, Mamm. N. A.* t. 37, f. 23.  
*Foetorius lutreola*, *Keys. & Blas. W. E.* p. 21.  
*Lutra minor*, *Erzl. Syst.* i. p. 451.  
*Tuhcuri leche*, *Vet. Akad. Hand.* 1789, p. 302, t. 40.  
*Vison lutreola*, *Gray, P. Z. S.* 1865, p. 117.  
Mank, *Nilsson, Illum. Fig.* p. 2, t. 8.  
? Marsh-Otter, *Langsdorff*.

*Hab.* Europe.

## 3. *Vison sibirica.* (Italze.) B.M.

Pale brown; head blackish, varied; spot on each side of nose, on upper and lower lips, and front of chin white; tail-end pale brown, like back. Varies, throat more or less white.

- Mustela sibirica*, *Pall. Spic. Zool.* xiv. p. 86, t. 4, f. 2.  
*Mustela italzi*, *Temm. Faun. Japon.* p. 34.

*Mustela natsi*, *Temm. Faun. Japon.* t. 7. f. 2 (misprint).

*Vison sibirica*, *Gray, P. Z. S.* 1865, p. 117.

*Hab.* Siberia (B.M.); Himalaya (B.M.); Japan (B.M.); China, Formosa (*Swinhoe, B.M.*).

Like *V. lutreola*; but much paler and smaller, and tail rather longer, compared with length of the body. Varies greatly in the quantity of white on the chin and throat. Males much smaller.

#### 4. *Vison canigula*.

B.M.

Pale reddish brown, scarcely paler beneath; face, chin, throat, sides of neck, and chest white; tail as long as the body and head, coloured like the back; feet whitish.

*Mustela canigula*, *Hodgson, J. A. S. Beng.* xi. p. 274, 1842.

*Vison canigula*, *Gray, P. Z. S.* 1865, p. 117.

*Var.* (male?). Fur darker; face less white; chest brown-and-white mottled. B.M.

*Mustela Hodgsonii*, *Gray, Ann. & Mag. N. H.* xi. p. 118, 1843; *List M. B. M.* p. 66.

*Hab.* Nepal Hills.

#### 5. *Vison Horsfieldii*.

B.M.

Dark red-brown, scarcely paler beneath; under lip white; tail elongate, slender, not so long as the body, rather darker at the end.

*Vison Horsfieldii*, *Gray, P. Z. S.* 1865, p. 118.

*Var.* 1. Chin white; a small white spot on chest. B.M.

*Var.* 2. Chin brown; edge of under lip only white. B.M.

*Mustela Horsfieldii*, *Gray, Ann. & Mag. N. H.* 1843, p. 113.

*Hab.* India, Bhootan (B.M.).

*Var.* 3. Lighter brown. B.M.

*Mustela italsi*, *Verreaux* (not *Temm.*).

*Hab.* Japan? (B.M.).

#### 6. *Vison subhemachalana*.

B.M.

Pale red bay, scarcely paler beneath; nose blackish; small spot on each side of nose, the chin, and sides of lower jaw, and two or three subconfluent spots on the chest white; tail elongate, and shorter than the body and head, black at the tip; body and head 13, tail to tip 7 inches.

*Mustela subhemachalana*, *Gray, C. M. B. M.* p. 67; *Gerrard, Cat. Bones B. M.* p. 95.

*Putorius subhemachalana*, *Hodgs. Journ. A. S. B.* 1837, p. 363; *Wagner, Schreb. Suppl.* ii. p. 234.

*Vison subhemachalana*, *Gray, P. Z. S.* 1865, p. 118.

*Hab.* India, Nepal.

	V. leucocephala.	V. lutreola.	V. sibirica.	V. Horsfieldii.	V. subhemachalana.
	in. l.	in. l.	in. l.	in. l.	in. l.
Length of skull .....	2 9 $\frac{1}{2}$	2 4	2 3 $\frac{1}{2}$	1 10	1 11
— palate .....	1 3	1 0	1 0	0 10	0 10 $\frac{1}{2}$
— tooth-line .....	1 0	0 10	0 9 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 8
— zygoma or orbit .....	1 3	1 0 $\frac{1}{2}$	1 0	0 9 $\frac{1}{2}$	0 10 $\frac{1}{2}$
— lower jaw .....	1 8 $\frac{1}{2}$	1 4 $\frac{1}{2}$	1 3 $\frac{1}{2}$	1 0	1 1
Width over the ears .....	1 2	1 0	1 0	0 10 $\frac{1}{2}$	0 10
— at front of orbits .....	0 8 $\frac{1}{2}$	0 7 $\frac{1}{2}$	0 6 $\frac{1}{2}$	0 5 $\frac{1}{2}$	0 6

### 5. GYMNOPUS.

The body elongate, slender. Limbs short; feet large; toes elongate, broadly webbed nearly to the tips, covered with scattered hair. Tail elongate, slender, covered with long spreading hair. The soles of the hind feet with three oblong pads, and an arched and a bald space behind them; the heel hairy. Teeth 34; premolars  $\frac{2}{3}$ .  $\frac{2}{3}$ ; the upper tubercular grinder small, transverse, the inner half rather larger than the outer one.

*Gymnopus*, Gray, *List Mamm. B. M.* xx. 1842; *P. Z. S.* 1865, p. 119.

\* Colour uniform above and below; head pale.

#### 1. *Gymnopus leucocephalus*.

B.M.

Golden fulvous, nearly uniform, scarcely paler beneath; head white; toes elongate, webbed, rather naked.

*Putorius nudipes*, *F. Cuv. Mamm. Lith. t.*

*Mustela nudipes*, *Desm. Mamm.*; Müller, *Verhand.*; Blainv. *Ostéogr. t.* 13 (teeth).

*Gymnopus leucocephalus*, Gray, *P. Z. S.* 1865, p. 119.

*Var.* End of tail paler; feet darker; front of the back with a pale vertical streak, wider and more distinct between the shoulders.

B.M.

*Hab.* Sumatra and Borneo.

The tail of the specimen in the Paris Museum is nearly destitute of hair; the soles of the feet are covered with hair.

The two stuffed specimens in the British Museum are nearly alike, but the skull of one is much larger than that of the other; one is 2 inches 4 lines, and the other 2 inches 2 lines long.

\*\* Belly pale yellow.

#### 2. *Gymnopus kathiah*. (*Kathiah*.)

B.M.

Dark brown; upper lip, chin, throat, chest, underside of body, and front of thighs bright yellow; tail dark brown, shorter than



the body and head, tapering, and of the same colour to the tip. Length of body and head 10, tail 4 inches; the soles of the hind feet bald, pads well developed, exposed.

*Mustela* (*Putorius*) *kathiah*, *Hodgson, J. A. S. B.* iv. p. 702, 1835.

*Mustela* (*Kathiah*) *auriventer*, *Hodgson, J. A. S. B.* x. p. 909.

*Gymnopus kathiah*, *Gray, P. Z. S.* 1865, p. 119.

*Hab.* India, Nepal.

	G. leucocephalus.		G. kathiah.	
	in.	lin.	in.	lin.
Length of skull .....	2	5	1	10½
— palate.....	1	1	0	9½
— tooth-line .....	0	9½	0	7
— zygoma and orbit.....	1	1	0	9½
Width over ears.....	1	0	0	10
— in front of orbit.....	0	7	0	5½
Length of lower jaw .....	1	4	0	11½

### 3. *Gymnopus strigidorsus*.

B.M.

Fur dark chestnut-brown, with a very narrow streak of a few longer yellow hairs down the centre of the back; edge of upper lip, the chin, throat, chest, and a narrow streak down the centre of the belly (wider hindwards) yellow, becoming whiter in the older specimens; tail slender, about half the length of the body, dark brown.

*Mustela strigidorsa*, *Hodgson, P. Z. S.* 1856, p. 398.

*Mustela strigidorsa*, *Hodgson, MS.*; *Gray, P. Z. S.* 1853, p. 181, t. 491.

*Gymnopus strigidorsus*, *Gray, P. Z. S.* 1865, p. 119.

*Hab.* India, Sikim.

Very like *M. kathiah*, but with a yellow dorsal streak, and the yellow on the belly much narrower. The soles of the hind feet bald; the pads exposed, distinct, developed.

### 4. *Gymnopus africanus*.

Reddish brown; beneath pale yellow, with a narrow central longitudinal reddish-brown ventral streak; tail reddish brown; hairs long.

*Mustela africana*, *Desm. N. Dict. H. N.* xix. p. 376; *Desm. Mamm.* p. 179.

*Putorius africanus*, *A. Smith, South Afr. Journ.* ii. p. 36.

*Mustela* (*Gale*) *africana*, *Schinz, Syn. Mamm.* p. 345.

*Gymnopus africanus*, *Gray, P. Z. S.* 1865, p. 120.

The specimen of *M. africana* in the Paris Museum is like *M. erminea*, but lighter, larger, and the belly with only a broad yellow streak on each side, leaving the middle brown; tail uniform reddish brown, like the back, to the end.

- B. Subplantigrade. Soles and between the pads hairy; body stout; tail short, bushy; anal glands none; false grinders  $\frac{3}{4}$ . Gulonina.—Gray, P. Z. S. 1865, p. 120.

### 6. GULO.

Body and tail bear-like. Soles densely hairy, with 6 small naked pads. Tail about as long as head, very full and bushy. Teeth 38; false grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ .

Gulo, Gesner, Quad. p. 554; Storr; Gray, P. Z. S. 1865, p. 120.

#### Gulo borealis.

B.M.

Brown, with a blackish dorsal disk.

Mustela gulo, Linn. Syst. Nat. i. p. 67; Gunnerus, Act. Nidros. iii. t. 3. f. 5.

Ursus gulo, Cuv. Tab. Elém. p. 112; Schreb. Säugeth. p. 525, t. 144, 144\*.

Ursus luscus, Linn. Syst. Nat. i. p. 71.

Gulo luscus, Baird, Mamm. N. A. p. 181.

Gulo borealis, Retz. Fauna, p. 25; Nilsson, Skand. Fauna, p. 139; Illum. Fig. xiii. t. 31.

Gulo vulgaris, Gray.

Gulo wolverene, Gray.

Gulo luscus, Richardson; Blainv. Ostéogr. Mustela, t. 3 (skeleton), t. 7 (skull), t. 13 (teeth).

Gulo leucurus, Hedenborg.

Taxus gulo, Tiedem. Zool. i. p. 377.

Gulo arcticus, Desm.

Ursus (Gulo) sibiricus, Pallas, Spic. Zool. xiv. t. 2.

Glouton, Buffon, H. N. xiii. p. 278, Supp. iii. t. 48.

Glutton, Penn.

Quickhatch or Wolverine, Edw. Birds &c. ii. p. 103, t. 103; Ellis, Hudson's Bay, i. p. 40, t. 4.

Rossmaka, Nieremb. Hist. Nat. p. 188.

Järf, Sundevall, K. Svensk. Vet. Akad. Handl. 1773, p. 222, t. 7, 8.

Carcajou, La Hontan.

Hab. North Europe and North America, North Asia, Siberia.

- C. Plantigrade. Soles of the hind feet bald, callous; body elongate; anal glands distinct; false grinders  $\frac{3}{4}$ ; tubercular grinders oblong, band-like; transverse.—Gray, P. Z. S. 1865, p. 121.

### 7. GALERA.

Tail elongate; heel hairy; sole with a central longitudinal depression behind, and obscurely divided into four large pads in front. Teeth 34; false grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ .

Galera, Brown, Jam.; Gray, List M. B. M. xx. p. 67.; P. Z. S. 1865, p. 121.

Eraria, Sund.

Eira, H. Smith.

**Galera barbata.** (Tiara.)

B.M.

Black-brown ; head paler ; throat with a large white or yellow blotch.

- Gulo barbatus*, *Retzius*.  
*Galictis barbara*, *Blainv. Ostéogr. Mustela*, t. 13. f. (teeth).  
*Gulo canescens*, *Ill. Prod.*  
*Galera barbata*, *Gray, P. Z. S.* 1865, p. 121.  
*Galea subfusca*, *Brown, Jam.* t. 29. f. 1.  
*Galictis barbara*, *Wagn. Schreb. Supp.* ii. p. 214.  
*Mustela barbara*, *Linn. Syst. Nat.* i. p. 67.  
*Mustela galera*, *Erxl.*  
*Mustela gulina*, *Pr. Max.*  
*Mustela taira*, *Griff. A. K. t.*  
*Viverra poliocephala*, *Traill, Mem. Wern. Soc.* iii. p. 440, t. 23.  
*Viverra vulpecula*, *Schreb.*  
*Eira ilya*, *Ham. Smith, Nat. Lib.* xiii. p. 202.  
*Guiana Weasel*, *Penn. Syn.* p. 225.  
*Le Grand Furet*, *Azara, Essai*, i. p. 197.  
*Grande Marte*, *Buff. H. N. Supp.* vii. t. 60.  
*Tayra*, *Cuvier, Règne Anim.* i. p. 146.  
*Taira*, *Cuvier, Oss. Foss.* iv. p. 481.  
*Huron mago*, *Azara.*

**Var. peruana.**

- Galictis barbara*, var., *Tschudi, Fauna Peruana; Arch. f. Naturg.* 1844, p. 248.

*Hab.* Tropical America : Trinidad.

**S. GRISONIA.**

Tail short ; body slender ; fur black below, white above ; soles of hind feet with an oblong pad behind and four oval pads in front (*Zool. Trans.* ii. t. 36). Teeth 34 ; false grinders  $\frac{2}{3}$  .  $\frac{2}{3}$ .

- Grisonia*, *Gray, P. Z. S.* 1865, p. 122.  
*Galictes*, *Bell, P. Z. S.* 1837, p. 45 ; *Trans. Zool. Soc.* ii. p. 201 ; 1841, t. 35, 36, 37.  
*Galidictes*, *Hodgson* (not *I. Geoff.*).  
*Huro*, *I. Geoff.*  
*Eraria*, sp., *Sund.*  
*Eira*, sp., *H. Smith, Nat. Lib.* xiii. p. 201.

**Grisonia vittata.**

B.M.

Black ; crown and upper parts of body white or yellowish white.

*Var.* Back blacker.

- Viverra vittata*, *Schreb. Säugeth.* p. 447, t. 124.  
*Mustela vittata*, *Blainv. Ostéogr. Mustela*, t. 13. f. (teeth).  
*Ursus brasiliensis*, *Thumb. Mém. Acad. Pétersb.* vi. p. 401, t. 13.  
*Lutra vittata*, *Traill, Mem. Wern. Soc.* iii. p. 437, t. 19.  
*Gulo vittatus*, *Desm. Mamm.* p. 175.  
*Mustela quiqui*, *Molina, Chili*, iv. p. 258.  
*? Mustela cuja*, *Molina, Chili*, p. 272.



- Viverra cuja*, *Shaw, Gen. Zool.* i. p. 433.  
*Viverra quiqui*, *Shaw, Zool.* i. p. 432.  
*Galictis vittata*, *Bell, Trans. Zool. Soc.* ii. p. 203, t. 35.  
*Galictis Allamandii*, *Bell, Trans. Zool. Soc.* ii. p. 204, t. 37.  
*Grisonia vittata*, *Gray, P. Z. S.* 1865, p. 122.  
*Grison*, *Buffon, H. N.*, 6d. *Allam.* xv. p. 65, t. 5; *F. Cuv. Mamm. Lith.* t.  
*Fouine de la Guyane*, *Buff. H. N. Suppl.* iii. p. 170, t. 22 & 25.  
*La cuja*, *Molini, Chili*, p. 258.  
*Petit furet*, *Azara, Essai*, i. p. 190.

*Hab.* Tropical and South America.

## Tribe II. LUTRINA.

Head depressed. Feet normal, subdigitigrade; toes webbed. Tail thick, tapering, depressed. Teeth normal; flesh-tooth acutely tubercular; tubercular grinders oblong, large. The nose convex and hairy beneath, without any central bald longitudinal groove. Aquatic.

- Lutrina*, *Gray, Ann. Phil.* 1825; *P. Z. S.* 1865, p. 123.  
*Lutrinæ*, *Baird, M. N. A.* p. 183.

The first upper false grinder is small, subcylindrical, placed on the inner side of the canine tooth; it is often lost early; it is sometimes to be seen on one side and not on the other; it is normally present in all the species, when perfect. The flesh-tooth of the Otters presents two very distinct forms: in some the inner lobe is moderate, its length only equalling about two-thirds of the outer part of the tooth; in others it is much larger, equal to the whole length of the outer portion of the tooth. The absolute size of the tooth seems to vary in the different species, and also in the different specimens of the same species, as is also the case with the upper tubercular grinder.

A. Tail simple, conical, depressed, rounded on the sides.

† The palms and soles of the feet bald between the pads; the palm-pads without any small circular warts on their hinder edges.

\* Muzzle entirely covered with hair; the upper margin of the nostrils only bald.

## 9. BARANGIA.

The nose entirely covered with hair; the narrow upper edge of the nostril only bare; ears short, rounded, hairy. Toes 5/5, rather elongate, broadly webbed, well covered with hair above; claws distinct, exposed, and blunt at the end. Palms and soles bald; the pads of the toes small, the central pads scarcely separated; the wrist-pad large and oblong. Tail conical, depressed, covered with hair. Skull elongate; orbit very imperfect, only defined by a slight prominence on the upper and lower edges; nasal and maxillary

bones produced to a line even with the middle of the orbit; intermaxillary very slender. The flesh-tooth acutely tubercular, with the internal lobes on the front part of the inner edge, rounded, slightly more than half the length of the outer edge of the tooth. Tubercular grinder much broader than long.

Barangia, *Gray, P. Z. S.* 1865, p. 123.

1. *Barangia sumatrana*. (Barang.) B.M.

Chestnut-brown, scarcely paler below; upper lip, chin, and upper part of the throat pale yellow.

*Lutra barang, F. Cuvier, Dict. S. Nat.* xxvii. p. 246; *Gerrard, Cat. Bones B. M.* p. 101.

Barang, *Raffles, Linn. Trans.* xiii. p. 254.

*Barangia sumatrana, Gray, P. Z. S.* 1865, p. 123.

*Hab.* Sumatra (*Raffles*); Malacca (B.M.).

Known from *Lutra leptonyx* (Horsfield) by the hairy nose, the larger claws, and the more equal toes; the upper surface of the web of the hind feet covered with close hair, the lower surface bald; the fur short, with numerous polished flattened bristles; the under-fur short, close, pale brown.

Skull somewhat like that of *Hydrogale*; but the nose is more produced, and narrower, only as wide as the distance from the front

Fig. 12.



*Barangia sumatrana.*

orbit to the intermaxillary suture. The suborbital foramen is not so large, but oblong, transverse, wider at the outer end.

2. *Barangia? nepalensis*. (Nepal Barang.) Skull, B.M.

The nose of the skull is considerably longer and wider, the part between the front of the orbits and the suture of the intermaxillary bones being considerably longer than its width in front of the orbits;



the nose is arched above. The zygomatic arch is much more bent out, especially at the hinder end. The hinder opening of the palate is wider, and arched in front; the suborbital aperture is oblong, triangular, arched beneath, and nearly as high as wide.

*Hab.* Nepaul (*Hodgson*).

The imperfect skull above described is in Mr. Hodgson's collection, and named *Lutra monticola*; but it is very unlike the skull of either of the two other specimens so named. It agrees with the skull of *Barangia sumatrana* in the entire want of the tubercular process on the side of the frontal bone, which usually defines the hinder upper edge of the orbit; but it differs from it in so many particulars that I am convinced that it must indicate a separate species.

\*\* *The muzzle partially hairy; front and upper edge of the nostrils bald, with the hair coming down in an angle between them in front.*

#### 10. LONTRA.

The muzzle hairy in the middle in front; upper and front edge of the nostrils bald and callous; the ears oblong, hairy. Toes strong, covered with hair above, half webbed; webs bald; claws strong, acute; palms and soles bald; pads well developed and divided. Tail conical, covered with hair. Skull dilated behind; nose very short, broad; forehead broad, flattened above; hinder edge of orbit marked with acute tubercles above and below; flesh-tooth with a very large rounded internal lobe extending the whole length of the tooth; tubercular grinders rather broader than long. The underfur very soft, scattered with short stiffer hairs.

*Lontra*, *Gray*, *List Mamm. B. M.* xxi. p. 70; *P. Z. S.* 1865, p. 125.  
*Suricoria*, *Lesson*.

##### 1. *Lontra enhydris*. (The Cayenne Otter.) B.M.

The hair on the centre of the nose forming a broad erect band; fur dark chestnut-brown; the sides of the face, under the ears, and upper part of the throat yellowish.

? *Lutra enhydris*, *F. Cuvier*, *Dict. Class. H. Nat.* xxvii. p. 243;  
*Fischer*, *Syn.* p. 226.

*Lontra enhydris*, *Gray*, *P. Z. S.* 1865, p. 125.

*Hab.* Cayenne (*B.M.*).

M. F. Cuvier does not describe the peculiarity of the muffle; so that I am not certain that this is the species he describes.

##### 2. *Lontra brasiliensis*. (The Brazilian Otter.) B.M.

The hair on the centre of the nose forming a narrow erect band; fur pale brown; upper lip, chin, and beneath rather paler.

*Lutra brasiliensis*, *Ray*, *Blumen. Abbild.* t. 93; *F. Cuvier*, *Dict. Sci. Nat.* xxvii. p. 244.

*Lutra brasiliana*, *Shaw*, *Zool.* i. p. 446.



*Lontra brasiliensis*, Gray, *List B. M.* p. 70; *P. Z. S.* 1865, p. 125.

*Lontre d'Amérique*, Cuv. *Règne Anim.* i. p. 151, t. 1. f. 3.

*Hab.* Brazil (*B.M.*).

### 3. *Lontra*? *insularis*. (The Trinidad Otter.)

Pale chestnut-brown, sides paler; sides of head and belly, lips, chin, throat, and chest yellowish white; under-fur short, very soft; hairs short and very smooth.

*Lutra insularis*, F. Cuvier, *Dict. Sci. Nat.* xxvii. p. 345.

*Lontra*? *insularis*, Gray, *P. Z. S.* 1865, p. 125.

*Hab.* Trinidad.

\*\*\* Muzzle bald on the upper edge and between the nostrils, forming a cross band with a straight upper and lower edge.

† Foot oblong; toes short, webbed to the claws, sharply clawed; pads of toes and palm large, close together.

## 11. LUTRA.

The muzzle bald, oblong-transverse, with a straight upper and lower edge; the upper edge of the nostrils bald; the ears oblong, hairy. Toes strong, webbed, covered with hair above, and bald beneath; toes and palm-pads well developed; claws strong, acute. Tail conical, covered with hair. Skull elongate; orbit defined behind by a well-developed acute tubercle above and below; the flesh-tooth with a large inner lobe.

*Lutra* (*a* and *b*), Gray, *Mag. Nat. Hist.* i. p. 380, 1837.

*Lutra*, Gray, *P. Z. S.* 1865, p. 126.

a. Forehead and nose of skull flat; the inner lobe of the flesh-tooth large, almost two-thirds the length of the inner margin of the outer portion of the tooth. The hinder dentiferous portion of the maxillary bone, bearing the tubercular grinder, produced to the hinder edge of the orbit.

† Europe.

### 1. *Lutra vulgaris*. (Otter.)

*B.M.*

The upper edge of the bald muzzle rather produced and angular, nearly as high as broad in the middle, brown, beneath ashy; ears, chin, and throat reddish ashy; edge of ears ashy.

*Lutra vulgaris*, *Erxl. Mamm.* p. 488; Nilsson, *Illum. Fig.* t. 20; *Bell, Brit. Quad.* p. 129, f. 4; *Blainv. Ostéogr.* *Mustela*, t. 8 (skull), t. 5 (skeleton), t. 13 (teeth); *Bonap. Icon.* t.; Gray, *P. Z. S.* 1865, p. 126.

*Mustela lutra*, Linn. *S. N. i.* p. 66; *Retz. F.* p. 18.

*Viverra lutra*, Linn. *F. S.* p. 12; *Pallas, Zoogr.* i. p. 76.

*La Loutre*, Buff. *H. N. vii.* p. 134, t. 2, xiii. p. 325, t. 45.

Otter, Penn. *B. Z. i.* p. 92, t. 8. f. 19.

*Var.* Black-brown; throat paler.

*Lutra roensis*, *Ogilby*, *Proc. Zool. Soc.* ii. p. 110, 1834.

*Hab.* Europe, Bohemia (*B. M.*).

## 2. *Lutra nudipes*.

Pale red; larger than *L. vulgaris*; the webs of the toes bald. The young mouse-colour.

*Lutra nudipes*, *Melchior*, *Säugeth. des danischen Staats*; *Schinz*, *Syn. Mamm.* i. p. 344; *Gray*, *P. Z. S.* 1865, p. 126.

*Hab.* Denmark, on the sea-coast.

A large Otter in the British Museum was presented by Mr. G. Vaughan as coming from Canada; I cannot discover any character by which it can be distinguished from the common European Otter, and I suspect the habitat given is a mistake.

†† *Asia*.

## 3. *Lutra chinensis*.

*B.M.*

Upper edge of the bald muzzle straight, transverse. Fur pale brown; ends of ears, lips, cheeks, chin, throat, underpart of the body, undersides of the legs, and underside of the base of the tail pale yellow. The suborbital foramen large, oblong, trigonal, nearly as high as wide in the middle; lower edge arched.

*Lutra chinensis*, *Gray*, *Loudon's Mag. Nat. Hist.* 1836, p. 580; *P. Z. S.* 1865, p. 126.

*Lutra nair*, *Swinhoe*, *Proc. Zool. Soc.* 1861, p. 390.

*Hab.* China (*Reeves*), *B.M.*; Formosa (*Swinhoe*), *B.M.*

## 4. *Lutra indica*.

*B.M.*

Bald; muzzle square. Fur pale brown, grizzled with white hairs; lips and under part of the body pale brownish white; under-fur short, with scattered, slender, elongated hairs.

*Var.* Tip of tail white.

*Lutra indica*, *Gray*, *Loudon's Mag. Nat. Hist.* 1837, p. 580; *P. Z. S.* 1865, p. 126.

*Lutra tavayensis*, *Hodgson*, *J. A. S. B.* viii. p. 319, 1839.

? *Lutra nair*, *F. Cuv. Dict. des Sci. Nat.* xxvii. p. 247.

*Hab.* India, Madras (*Walter Elliot*), *B.M.*

This may be the same as the former, *L. chinensis*; but I have not been able to examine the skull.

- b. *Forehead and nose of skull convex; the inner lobe of the flesh-tooth very large, occupying the whole of the inner side of the outer portion of the tooth; the hinder dentiferous portion of the maxillary bone, bearing the upper tubercular grinder, produced behind the hinder edge of the orbit.*  
Lutrogale.

\* *Asia.*

#### 5. *Lutra monticola.*

B.M.

Grey-ash ground; greyer beneath. Inner lobe of the flesh-tooth very large, as long as outer edge.

*Lutra monticola*, *Hodgson*, *P. Z. S.* 1855, p. 126 (not described); *Gray*, *P. Z. S.* 1865, p. 127.

*Hab.* Himalaya.

The Museum has received skulls of two distinct species under the above name, one with large and the other with small inner lobe to the flesh-tooth.

The skins belonging to the skulls with the large teeth are in a very bad condition; they are probably bleached.

Consult also *Lutra simul*, *Horsf. Zool. Journ.*; *Müller*, *Verhand.* p. 51; from Sumatra and Borneo, with strong falcate claws. I have not seen this species, nor *Lutra katab* (*Hügel*, *Reise*) from Cashmere.

#### 6. *Lutra Swinhoei.*

*Lutra* (*Hydrogale*) *Swinhoei*, *Gray*, *P. Z. S.* 1867, p. 182.

Two imperfect skulls sent by Mr. Swinhoe from Formosa certainly belong to two very distinct species.

The most perfect skull, which wants the cutting-teeth, belongs to the first section of the genus as defined in this Catalogue, with moderate-sized tubercular grinders, and a moderate-sized inner lobe to the flesh-tooth.

The second, on the contrary, which only consists of the front portion of the upper jaw, with the teeth in change from the milk to the permanent series, has a very large square tubercular grinder and a very large rounded internal lobe to the flesh-tooth, as in the second section, which I have called *Lutrogale*.

I propose to indicate this species by the name of *Lutra Swinhoei*. It is easily characterized by the small size of the upper cutting-teeth, the series forming only a width of  $4\frac{1}{2}$  lines; while the series of most other Indian Otters occupy 6 lines (or half an inch), or sometimes rather more.

\*\* *America.*

#### 7. *Lutra macrodus.*

B.M.

Dark brown; upper lip, chin, and beneath paler. Fur rather harsh. Upper edge of the bald muzzle straight, transverse; the flesh-tooth with a very large internal lobe, as long as the tooth. Claws large, acute.



*Lutra macrodus*, Gray, *P. Z. S.* 1865, p. 128.

*Hab.* Brazil (*Parzudaki*). Male and female.

This Otter is about the size of *Lontra brasiliensis*; but it is at once distinguished from that species by the large size of the naked muzzle and the harshness of the fur. It is very like *L. vulgaris*; but the inner lobe of the flesh-tooth appears considerably larger; and M. Parzudaki assured me that he had received the pair direct from Brazil, from a collector who shot them.

## 12. NUTRIA.

Like *Lutra* externally, with the bald muffle transverse, narrowed, and arched below. Skull short, broad. Nose broad. Forehead flat; the orbit defined behind by a well-marked conical tubercle above and below. The flesh-tooth with a very large internal lobe, extending the whole length of the tooth. Hinder portion of the palate short.

*Nutria*, Gray, *P. Z. S.* 1865, p. 128.

This genus is at once known from the Otter with the large internal lobes to the flesh-tooth, by the shortness and breadth of the skull and the shortness of the hinder contracted portion of the palate.

### *Nutria felina*.

B.M.

Fur dark brown, with scattered, flat, whitish-tipped hairs. Lips, sides, and beneath pale brown. The web of toes scattered with hairs above.

*Lutra felina*, Molina, *Hist. Nat. Chili*, plate 2 (skull).

*Lutra chilensis*, Benn. *P. Z. Comm. Sci.* ii. 1832 (!); Gerrard, *Cat. Bones B. M.* p. 101 (!).

*Lutra californica*, Gray, *Mag. N. H.* i. p. 580, 1837 (!); *List Mamm. B. M.* p. 71 (!); Baird, *Mamm. N. A.* p. 187 (?).

*Lutra platensis*, Waterh. *Zool. Beag.* t. 40. f. 4 (skull); D'Orb. *Voy. A. Mérid.* t. 12. f. 23; Gerrard, *Cat. Bones B. M.*; Verreaux (skull), *B. M.*

*Nutria felina*, Gray, *P. Z. S.* 1865, p. 128.

*Chinchimen*, Molina, p. 261.

*Hab.* In the sea, Chili (*Bennett*); Peru, island of Chiloe (*Tschudi*); California (*P. P. King*); Kamschatka (*Verreaux*).

Mr. Tomes observes, "The Otter collected in Guatemala by Mr. Salvin agrees with the description and figure of *L. chilensis* (Waterh.), especially in the inner lobe of the flesh-tooth having the same angular form as in that species. In *L. platensis* the inner lobe of the flesh-tooth approaches more or less to a semicircular form. Dr. Baird figures the flesh-tooth of *L. canadensis* as in *L. platensis*" (*P. Z. S.* 1861, p. 280).

Consult:—

(1) *Lutra montana*, Tschudi, *Fauna Peruana*, p. 120. *L. supra obscura*, fusco-rufa, fusco irrorata, subtus nigricans.—*Hab.* Peru.—Fresh water, 9000 feet above the sea. Length of body 5–6 inches, tail 10 inches.

(2) *Lutra paraguensis*, Rengger, Säugeth. v. Paraguay, p. 128; Wagner, Schreb. Säugeth. ii. p. 216; Burm. La Plata, ii. p. 410. *Nutria*, Azara, Quad. i. p. 304.—*Hab.* Paraguay.

(3) *Lutra? aterrima*, Schrenck, Amurland, p. 43; *Viverra aterrima*, Pallas, Zoogr. Ross.-Asiat. i. p. 81; *Mustela aterrima*, Pallas, Middendorff, Sibirische Reise, i. p. 70.—*Hab.* Sea of Ochotsk.

### 13. LUTRONECTES.

The muzzle bald, oblong, transverse, with a straight upper and lower edge; the upper edge of the nostril bald. Ears oblong, hairy. Feet rather large; toes strong, webbed, covered with hair above, and bald beneath; toes and palm-pads well developed, those of the palm separated from the toes by a broad bald space; claws strong, acute. Tail conical, covered with hair. Skull elongate; orbit very obscurely defined behind; the flesh-tooth with a large internal lobe about two-thirds of the length of the outer edge.

The toes in this genus are strong, thick, and well webbed, rather larger than in the typical Otters.

The skulls are not quite the normal skulls of the genus *Lutra*, as they have scarcely an indication of any tubercle defining the upper hinder portion of the orbit, and only a very obscure angle on the front of the zygomatic process, defining, or rather separating the lower hinder part of the orbit from the mastoid cavity. In this respect the skulls are nearly intermediate in form between the skulls of *Hydrogale* and *Barangia*; they have the hinder edge of the orbit above and below rather more defined than in *Hydrogale*, and yet less so than in *Barangia*, where the protuberances that define the orbit behind are much smaller than in *Hydrogale*.

The genus differs from *Hydrogale* in the skin between the pads being bald as in the true Otters (*Lutra*). It agrees with *Hydrogale* and *Lutra* in the muzzle being entirely bald and square between the nostrils; while in *Barangia* the muzzle is entirely covered with hair.

The nose of the skull is short; the nasal aperture very oblique, edged on each side by the narrow intermaxillaries, which are continued up and separate the front half of the nasal from the maxillæ; the infraorbital foramen is very large; the nasal extends back as far as the hinder edge of the maxilla on its sides.

#### Leutronectes Whiteleyi.

B.M.

Dark brown; cheeks, lips, chin, and throat greyish white.

? *Lutra vulgaris*, Temm. Fauna Japonica, p. 35; Schrenck, Reisen im Amurlande, p. 43.

*Lutronectes Whiteleyi*, Gray, P. Z. S. 1867, p. 181.

*Hab.* Japan.

Like many other Otters, these so closely resemble the Common European Otter that I am not surprised that M. Temminck should have confounded them with that species.

Length of body and head  $17\frac{1}{2}$ , of tail 10 inches.



Skull:—Length about 4 inches (back imperfect); width at back of zygomatic arch 2 inches 1 line; length of palate 1 inch  $7\frac{1}{2}$  lines,

Fig. 13.

*Lutronectes Whiteleyi.*

of tooth-line 1 inch  $7\frac{1}{2}$  lines; width at the upper tubercular grinder 1 inch 5 lines.

The two skulls slightly differ in the size of the teeth and in the width of the palate.

I have great pleasure in naming this species after Mr. Henry Whiteley, junior, of Woolwich, who brought it from Hakodadi in Japan, with many other interesting animals, and who has become a martyr to science in the course of his labours as a natural-history collector. Some ardent "anthropologists" having requested him to procure them some Ainos' skulls, he tried to procure them, was informed against by a foreign consul who did not appreciate science, imprisoned in Japan, and then sent home in confinement. When I first saw him on his return he was almost a living skeleton, in a most pitiable state of bodily and mental prostration. Under good nourishment and nursing he has slowly recovered, and is gone to the Peruvian Andes to continue his labours as a zoological collector.



†† Feet oblong, rather elongate; toes rather slender, free at the end, bluntly or imperfectly clawed; pads of palms large, of toes slender, separate.

#### 14. AONYX.

Muzzle bald, oblong, transverse; upper and lower edge nearly straight. Toes half webbed, index and middle united together to the third joint; claws obsolete or rudimentary and blunt; the inner toe very short, index longer, middle and fourth longest and equal, the fifth shorter than the index. Skull rather short, ventricose, and convex behind; nose short; forehead convex, arched; orbit defined by distinct conical tubercles above and below. Flesh-tooth with a very large internal lobe, nearly as long as the outer portion of the tooth, with two cross ridges on the crown; the upper tubercular grinder large, massive, rather wider than long.

The flesh-tooth of the *Aonyx* is larger and wider than in the Otters with well-developed claws. The outer margin of the tooth is produced outwards beyond the edge of the jaw, and furnished with a distinct margin.

*Aonyx*, Lesson, *Man.* p. 157; Gray, *Loudon's Mag. N. H.* 1857, p. 550; *P. Z. S.* 1865, p. 129.

*Leptonyx*, Lesson.

*Anahyster*, A. Murray, *Proc. Roy. Phys. Soc. Edinb.* i. p. 157 (from skull only).

\* *African. Claws very rudimentary. Anahyster.*

##### 1. *Aonyx Lalandii*.

B.M.

Brown, beneath paler; sides of the face, to the orbits and ears, throat, chin, and chest yellowish, divided from the darker colour by a defined line; shoulders and fore legs darker.

Very young animals are greyish white; the cheeks, chin, throat, and chest white; the shoulders browner.

*Lutra inunguis*, F. Cuv. *Dict. Sci. Nat.* xxvii. p. 248; *Blainv. Ostéogr. Mustela*, t. 8 (skull).

*Lutra (Aonyx) inunguis*, Fischer, *Syn.* p. 228.

*Aonyx inunguis*, Gerrard, *Cat. Bones B. M.* p. 101.

*Aonyx Lalandii*, Lesson, *Man.* i. p. 57; Gray, *Cat. Mamm. B. M.* p. 71; *Ann. & Mag. N. H.* 1837, p. 119; *P. Z. S.* 1865, p. 129.

*Lutra capensis*, Schinz, *Cuv. Thierr.* i. t. 214.

Var.? *Anahyster calabaricus*, A. Murray, *Proc. Roy. Phys. Soc. Edinb.* p. 157 (skull, B.M.).

*Lutra gambianus*, Gray, *Cat. Mamm. B. M.* p. 111 (skull, B.M.).

*Hab.* South Africa, in rivers and lakes; Cape of Good Hope (A. Smith); Mossambique (Peters).

*L. poensis*, Waterhouse, *P. Z. S.* 1838, p. 60 ("Shining brown; chest, chin, and throat fulvescent; tail half as long as the animal; muzzle bare"), from Fernando Po, described from a skin without feet, which is no longer to be found, is perhaps the same as the former.

\*\* *Asiatic. Claws rudimentary, blunt. Aonyx.*

2. **Aonyx leptonyx.** (Indian Aonyx.) B.M.

Brown, rather paler beneath; cheeks, chest, and sides of the neck paler; chin and upper part of the throat white. The inner lobe of the flesh-tooth very large.

Fig. 14.



*Aonyx leptonyx.*

*Lutra leptonyx*, Horsf. Zool. Research. vii. t.; Fisch. Syn. p. 277; Wagner, in Schreb. Supp. t.

*Lutra cinerea*, Illiger, in Schinz, Cuv. Thierr. i. p. 879.

*Lutra perspicillata*, I. Geoff. Dict. Class. H. N. ix. p. 519.

*Aonyx Horsfieldii*, Gray, Ann. & Mag. N. H. 1837, p. 119.

*Aonyx leptonyx*, Gray, List Mamm. B. M. p. 71; P. Z. S. 1865, p. 130 (fig. skull).

*Mustela fusca*, Desch. MS. icon ined. B. M.

*Mustela lutra*, Marsden, Sumatra, t. 12.

*Semul*, Raffles, Linn. Trans. xiii. p. 254.

*Hab.* Java; Sumatra.

3. **Aonyx indigitata.** B.M.

Brown, paler below; toes very short; claws short and blunt.

*Lutra indigitata*, Hodgs. Ann. & Mag. N. H. iv.; Blainv. Ostéogr. t. 24. f. 8 (skull).

*Aonyx indigitata*, Gray, Ann. & Mag. N. H. 1837, p. 119; P. Z. S. 1865, p. 131; Gerrard, Cat. Bones B. M. p. 101.

*Aonyx sikimensis*, Hodgson, Horsf. Ann. & Mag. N. H. xvi. p. 109, 1855; P. Z. S. 1856, p. 399.

*Hab.* Nepal Hills and Tarai.

Specimen very imperfect. "Colour medial earthy brown; paler below, especially on the head and neck. Length, snout to vent 24, tail 13, head  $4\frac{1}{2}$ , palm  $2\frac{5}{8}$ , planta  $3\frac{1}{2}$  inches."—Hodgs. l. c.



4. *Aonyx aurobrunnea*.

B.M.

*Lutra aurobrunnea*, *Hodgs. MS. : Ann. & Mag. N. H. ; Proc. Zool. Soc.* 1858, p. 126; *Gray, Cat. Mamm. B. M.* p. 71.

*Aonyx aurobrunnea*, *Gray, Ann. & Mag. N. H.* 1837, p. 119; *P. Z. S.* 1865, p. 131.

*Hab.* Nepal.

Specimen in very bad state.

Mr. Hodgson states, "the Otters, in the upper region of the Himalaya, are represented by the small golden and brown species, *L. aurobrunnea*, in the central by *L. monticola* and *L. indigitata*, and in the lower by the large Chinese species *L. sinensis*" (*Proc. Zool. Soc.* 1855, p. 126).

†† *The under surface of the feet, between the finger-pads and palms, sprinkled with scattered soft hairs; the inner part of the under surface of the two inner hind toes with a band of close, short, soft hairs; the muzzle transverse and bald.*

## 15. HYDROGALE.

Like *Lutra* externally; but the feet large, elongate, very broadly webbed; the toes, especially of the hinder feet, long; the pads of the toes and palms are less developed and separated from each other by a greater distance; the under surface of the feet sprinkled with scattered soft hairs, and the edges of the two inner hind toes have a band of close, short, soft hairs. The skull elongate; the nose very short; the forehead narrow; the orbit scarcely defined behind, without any indication of a tubercle on either the upper or lower edge. The flesh-tooth with the internal lobe shorter than the outer portion of the tooth; the tubercular grinder rhombic, wider than long; the hinder portion of the palate rather short, with an arched posterior opening.

*Hydrogale*, *Gray, P. Z. S.* 1865, p. 131.

The nose of the skull very short, much broader than long from front of orbit to the intermaxillary bone; nose-aperture large, oblique; the hinder and outer portion of the upper jaws hairy; the tubercular grinder produced beyond the back edge of the orbit; nasal bones produced beyond the middle of the orbit; suborbital foramen large, oblong, transverse, occupying half the under edge of the orbit.

*Hydrogale maculicollis*. (Fig. 15.)

B.M.

Blackish brown; throat, breast, and belly yellow-spotted; upper lip and beneath paler.

? *Lutra maculicollis*, *Lichtenstein, Arch. f. Nat.* 1835, i. 89, t.

*Lutra Grayi, J. E. Verreaux, Rev. et Mag. Zool.* 1857 (type, B.M.); *Gerrard, Cat. Bones, B. M.* p. 101.

*Hydrogale maculicollis*, *Gray, P. Z. S.* 1865, p. 132 (fig. skull).

*Hab.* South Africa, Caffreland; Natal (*Verreaux, Brit. Mus.*).



Fig. 15.

*Hydrogale maculicollis.*

†††. The palms and soles of the feet hairy between the pads, the hinder pads with four small circular rugosities; the bald muzzle large, broad, and high, angularly produced above, and continued by a narrow streak to the lips beneath.

#### 16. LATAX.

The muzzle bald, large, higher than broad, upper edge angular, produced above, the lower one arched; the feet moderately large; toes strong, hairy above, webbed; claws large, acute; tail conical, covered with hair. Under-fur long, very dense and exceedingly soft, very closely covered with longer silky hair. Skull rather broad, depressed, ventricose behind; the forehead flat, rather broad; orbit defined by a strong acute conical prominence on the side of the forehead behind, above, but not below; the palate rather concave; the flesh-tooth large, the inner lobe as large as the outer section of the tooth; the upper tubercular grinder large, massive, rather broader than long.

*Lataxina*, Gray, *List. Mamm. B.M.* p. 70.

*Latax*, Gray, *Ann. & Mag. N. H.* 118 (not *Gloger*); *P. Z. S.* 1865, p. 132.

*Lutra*, § c, Gray, *Loudon's Mag. N. H.* 1837, i. p. 380.

#### *Latax canadensis.* (Canadian Otter.) B.M.

Black-brown, beneath paler; cheeks, lips, chin, and throat pale ashy-brown; front of neck grey-brown.

Very young black above and below, with very short close fur; lips whitish; claws very acute, whitish.

*Var.* Nearly uniform black; under-fur very soft, brown; the upper and lower lip, chin, and sides of throat brown.

*Lutra canadensis*, Sabine, *Franklin's Voy.* p. 653; *Schreb. Säugeth.* t. 126. f. 13; *Baird, Mamm. N. A.* p. 184, t. 28 (skull); Gray, *Ann. & Mag. N. H.* 1837, p. 119.

*Lutra brasiliensis*, Harlan; *Godman.*

- Lutra hudsonica*, *F. Cuv. Supp. Buffon*, i. p. 194, 1831.  
*Lutra vulgaris canadensis*, *Wagner, Schreb. Supp.* ii. p. 256.  
*Lutra lataxina*, *F. Cuv. Dict. Sci. Nat.* xxvii. p. 243.  
*Lataxina mollis*, *Gray, List Mamm. B. M.* p. 70.  
*Latax lataxina*, *Gray, Ann. & Mag. N. H.* i. p. 119, 1837.  
*Latax canadensis*, *Gray, P. Z. S.* 1865, p. 133.  
*Lutra canadensis*, var., et *Lataxina mollis*, *Aud. & Bachm. N. A. Quad.* iii. p. 976, f. 122, 1853.  
*Lutra californica*, *Baird, N. A. Mamm.* p. 187 (not *Gray*).

*Var.* Smaller.

*Lutra destructor*, *Barnston, Canadian Naturalist*, 1863 (fig. foot and skull); see *Gray, P. Z. S.* 1865, p. 133.

*Hab.* North America, Canada.

*B.* Tail elongate, rather depressed, with a cord-like ridge on each side.

### 17. PTERONURA.

Head depressed; ears hairy, small; muzzle entirely covered with hair. Fur very soft, short, with a fine short soft under-fur. Feet large and strong; toes 5/5, elongate, strong, widely webbed to the ends; toes on fore feet nearly equal, thumb smaller; the three outer toes of the hind feet are rather longer than the first toe, and the great toe a little smaller; claws large, compressed, acute; soles and palms bald to the heel, striated. Tail conical, tapering, rather depressed, covered with short hair, and furnished with a subcylindrical prominent ridge on each side; end more depressed, two-edged, and fringed at the tip. Teats four, abdominal. Skull elongate, rather high for an Otter; face very short; nose-opening large, nearly erect; nose with an oblong depression on each side near the orbits; orbits very incomplete, moderate, with a very large oblong aperture beneath the lower edge, and with an obtuse prominence in the front of the upper edge near the side of the nose; forehead shelving, flat, straight, sides over the orbits straight and short, triangular behind the very small conical supraorbital process; crown with a very narrow central ridge; brain-case very long, twice as long as the face to the back of the orbits, very narrow and compressed in front, broad and swollen behind; zygomatic arch very strong, broad, leaving a very large wide cavity beneath, infraorbital process slightly marked; the occipital end nearly erect, nearly twice as broad as high; the foramen magnum oblong, transverse; the upper edge of the foramen thick, concave, with two large roundish perforations close together in the upper part for the passage of two blood-vessels to the brain-cavity. Palate rather concave, narrowed behind, with a square hinder nasal opening. The four central cutting-teeth in each jaw moderate, equal, the outer larger and broader. The premolars conical; the front very small, on the inner side of the hinder edge of the base of the canine; two others conical, with distinct cingulum. The flesh-tooth large, with the inner lobe nearly as long as the outer edge, oblong, the front side being broadest. The last or tubercular grinder oblong, transverse, nearly twice as broad as long, with four distinct tubercles. The



flesh-tooth of the lower jaw oblong, more than twice as long as broad, with three large anterior and one very large posterior lobes; the hinder or tubercular grinder moderate, with a nearly circular crown.

*Pteronura*, Gray, *Loudon's Mag. Nat. Hist.* 1837, p. 580; *P. Z. S.* 1865, p. 134.

*Pteronurus*, Lesson.

*Pterura*, Wiegman; Schinz.

### *Pteronura Sandbachii*.

B.M.

Fur bright bay-brown above and below; hairs all nearly of a uniform brown colour; lips and a large irregular patch on the throat and some spots on the side of the throat bright yellow.

*Pteronura Sandbachii*, Gray, *Loudon's Mag. N. H.* i. p. 580, 1837; *Ann. & Mag. N. H.* ii. p. 285, t. 14, 1839; *P. Z. S.* 1865, p. 131; 1868, p. 66, t. 7 (and skulls).

*Pterura Sandbachii*, *Wiegmann's Arch.* iv. p. 392, 1838 (published 1839).

*Hab.* Demerara (*Mus. Roy. Institution, Liverpool*). Young.

Length of adult female (a tanned skin in the possession of Mr. Bartlett), body and head 43, tail 24, = 67 inches. Throat with two bright yellow streaks and some yellow spots.

Var. *Kappleri*.

B.M.

Bright golden brown above and below; hairs brown, with numerous white hairs intermixed; lips, chin, and an elongated streak on each side of the throat, which is dilated behind, and one branch of it extended up to the side of the chest, white.

Young duller, greyer; lips and throat spotted, white.

*Lutra brasiliensis*, Krauss, *Mus. Stutgardt*.

*Hab.* Surinam (*Kappler*).

The white hairs are better seen when the fur is examined by a hand magnifier.

Skull of adult:—Length 6, of brain-case from the back edge of the orbit  $4\frac{1}{4}$ , of the zygoma and orbit  $3\frac{1}{2}$  inches; width at the zygomatic arch  $3\frac{3}{4}$ , at the back of ear-opening  $3\frac{1}{8}$  inches; height of skull and lower jaw  $2\frac{3}{4}$  inches. The skull of the young specimen chiefly differs from that of the adult in the space between the orbits and masseter muscles being thicker, and in the supraorbital process before the upper hinder edge of the orbit not being developed. These are the usual characters of the skulls in young animals.

The complete hairiness of the nose at once shows that it is not *Lutra brasiliensis*, as Dr. Krauss named it, which is the type of the genus *Lontra*.

It is probable that there is another species of this genus, which has been described under the name of *Lutra solitaria*, Natterer. It was obtained by that enterprising traveller and collector at Ypanema, in Brazil, and is described as "chestnut-brown, and dirty white beneath."

During the first visit of the British Association to Liverpool in 1837 I observed a depressed-tailed very large-footed Otter in the



Museum of the Royal Institution of that town, which had been collected in Demerara by Mr. Edmondson, and presented to the Museum by my friend Mr. Sandbach. I brought it before the Natural-History Section, and named it *Pteronura Sandbachii*.

A description of the specimen was published in 'Loudon's Magazine of Natural History' for 1837, i. p. 580.

Mr. Gould kindly made me a drawing of the specimen during the meeting, which was engraved, with some notes on the genus, in the 'Annals and Magazine of Natural History' for 1839, ii. p. 285, t. 14. This plate is copied in Wiegmann's 'Archiv' for 1838, p. 392, t. 10 (which did not appear until late in 1839).

Professor Wiegmann at first doubted the distinctness of the genus from *Enhydris*, but after he received the plate admitted that the genera were distinct. He proposed to alter the name of the genus from *Pteronura* to *Pterura*.

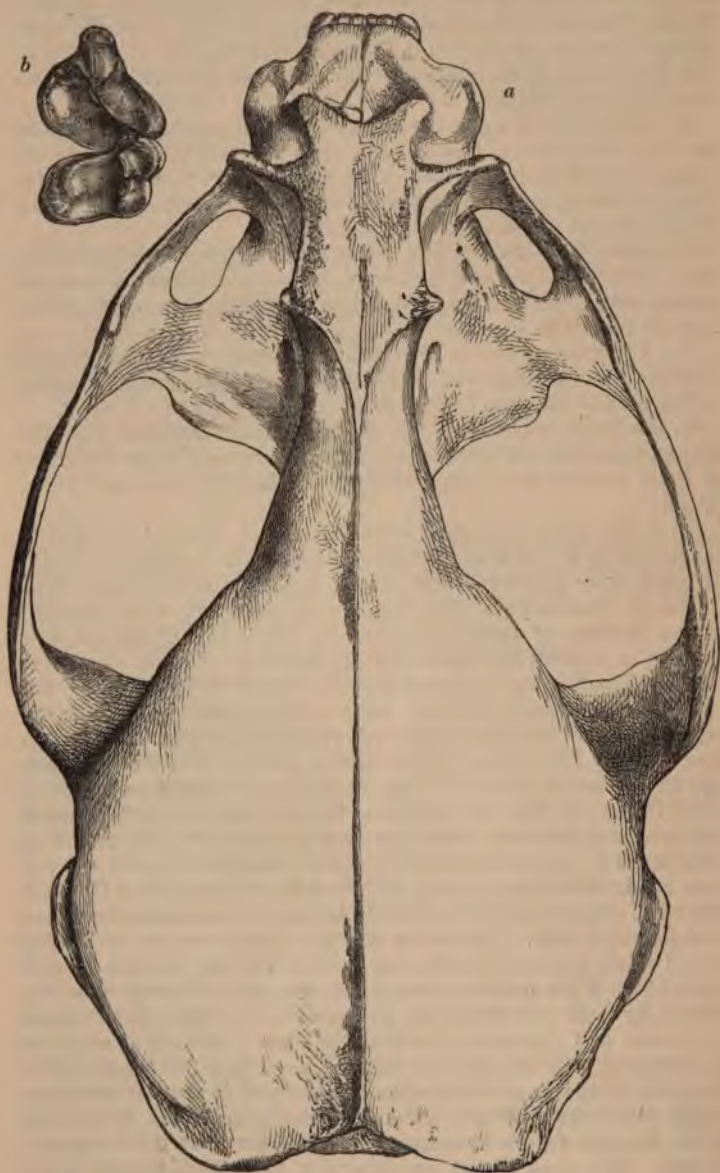
The Liverpool specimen has remained unique up to this time, and *Pteronura* was the only well-established genus of Mammalia wanting in the British-Museum Collection.

In the latter end of 1867 the British Museum received from Dr. Krauss the skins of a large female Otter and its cub, under the name of *Lutra brasiliensis*, which had been obtained in Surinam by Mr. Kappler.

As I had lately published a monograph of *Mustelidae*, including the species of *Lutrine*, in the 'Proceedings of the Zoological Society' for 1865, these specimens were entered in the register, and put away for future examination. But the skin which Mr. Bartlett exhibited at the Meeting of the Society, Jan. 9, 1868, having excited new interest as regards the specimens of Otters, the skins in store were examined, and it was soon seen that the Otter from Surinam was not the true *Lutra brasiliensis*, and was very nearly allied to, if not the same species as, the skin that Mr. Bartlett had exhibited. The specimen chiefly differs from Mr. Bartlett's skin in the tail being thick and strong, and convex on the upper and lower surface, nearly as in other Otters; so that the flatness of the upper and under surface of the prepared skin was doubtless produced by the preparation or dressing of it; and it was this excessive flatness that gave the tail such an artificial appearance. I believe that the tail of a Common Otter (*L. vulgaris*) might artificially be made to resemble the tail of that prepared skin. That there was considerable cause for scepticism I think is proved by the experiment that Mr. Bartlett himself made to see if the cord-like margins on the side of the tail were not artificially made and would not disappear in soaking and stretching.

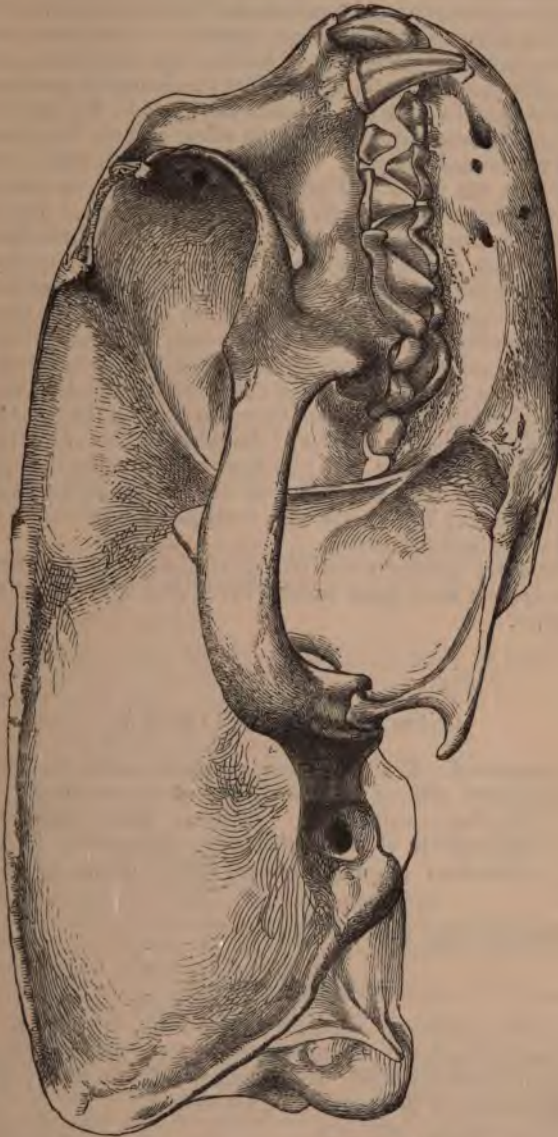
As soon as I discovered the Surinam Otter I thought it ought to be compared with the one from Demerara. I therefore wrote to the Secretary of the Royal Institution of Liverpool to request that they would allow the specimen, which I originally described, to be sent to the Museum for me to examine it, and show it to the Zoological Society. He, most kindly and liberally, immediately granted my request, and, on a second application, allowed me to extract the skull of the specimen, in order that there might be no doubt on the

Fig. 16.



*a.* Upper surface of skull of *Pteronura Sandbachii*.  
*b.* Upper sectorial tooth and tubercular grinder of *P. Sandbachii*.

Fig. 17.



Side view of skull of *Pteronura Sandbachii*.



subject of the specific identity, as there is a slight difference in the colouring of the throat, and also a very great difference in the size of the specimens.

A careful examination and comparison of the specimen has satisfied me that the Demerara and Surinam Otters are of the same species. The specimen in Liverpool, from Demerara, is a very young animal, with its milk series of teeth. The tail of the Demerara specimen has the same marginal rib as the Surinam one; but in the preparation it has been too much depressed on the sides, and the sides also are artificially extended, giving it a fin-like appearance, which induced me to give it the name of *Pteronura*. *Craspedura*, or margined-tailed, would have been a much more appropriate one. The bones have been almost entirely extracted from the skin of the feet, and they have been evidently flattened by the stuffer. The size and flatness of the feet in this specimen, which gave the animal so much apparent relation to the Sea-Otters, do not exist in the unstuffed specimen from Surinam, which has large feet, with very strong toes united by a broad web extending to the end of the toes, and large acute claws, the feet being quite of the normal or usual form of the Otters', and having no more resemblance to those of the Sea-Otter or *Enhydris* than is the case in any of the other species of the genus.

The skull is very long and has sharply tubercular teeth, which also shows that it is far removed from the very short, broad, square skull, with the very broad teeth with hemispherical tubercles, that is so peculiar to the Sea-Otter.

The Surinam specimen and the reexamination of the Demerara specimen and its skull have enabled me to give a revised character to the genus.

### Tribe III. ENHYDRINA.

Head depressed. Hind feet large, elongate, rather fin-like, hairy above and below, oblique, truncated; the outer toes largest; claws small. Tail short, cylindrical. Grinders broad, massive, flat-topped. Flesh-tooth oblong, triangular, transverse; inner side narrow, tubercular; grinders similar, larger, outer edge narrow. *Marine*.

*Enhydrina*, Gray, *P. Z. S.* 1865, p. 135.

#### 18. ENHYDRIS.

Tail short, cylindrical. Muzzle bald, oblong, triangular. Soles entirely hairy, like the upper surface of the feet; claws acute, small. Skull much dilated behind, and swollen. Teeth 34; premolars  $\frac{3}{3} - \frac{3}{3}$ ; grinders very large, massive, flat-topped.

*Enhydra*, Fleming, *Phil. Zool.*

*Enhydris*, Fischer, *Syn. Mamm.* p. 228; Gray, *Cat. Mamm. B. M.* xxi. p. 72; *P. Z. S.* 1865, p. 135, t.

Pusa, *Aken.*

Latax, *Gloger* (not *Gray*).

Professor Lichtenstein's figure of the animal, in the Darst. Säuegeth. t. 49, represents the hind feet as too small and too much like those of a common Otter. The hind foot is like a compressed fin, quite as much, and even more so than in the case of the Seal. It differs from the foot of the Seal in the toes gradually increasing in length from the inner to the outer one, making the foot appear obliquely truncated. In the Seals, the inner and outer toes are the longest, and the middle ones are the shortest. In some respects the foot of the Sea-Otter resembles that of the Beaver; but it differs in the toes, as well as in being entirely covered, both above and below, with short, close, silky hairs. The front claws are small, short, and very acute. In the very young animal they are very acute and strongly curved at the tip, so as to be almost subspiral. The hinder claws are small and acute, rudimentary in the very young specimens. The muffle is bald: it forms a bald edge round the nostrils, which are only separated from each other by a rather narrow septum; and it forms a rather triangular bald space over them, the upper edge being sloping on each side, and rather arched in the centre. The figures in Capt. Cook's 'Voyages,' t. 57, give the best idea of this animal, showing the fin-like form of the hind feet; but the tail appears too depressed and Beaver-like.

**Enhydrius lutris.** (Kalan, or Sea-Otter.) B.M.

Black, grizzled with silver-white hair.

*Var.* Head white or grey.

*Lutra marina*, Steller, *Nov. Com. Petrop.* ii. p. 367, t. 16, 1751; Schreb.

*Säuegeth.* t. 128; Blainv. *Ostéogr.* Mustela, t. 8 (skull).

*Mustela lutris*, Linn.; Shaw, *Mus. Lev.* t.

*Phoca lutris*, Pallas, *Zoogr. R.-Asiat.* i. p. 100.

*Lutra lutris*, F. Cuv. *Suppl. Buffon, Mamm.* p. 204.

*Enhydra marina*, Flem. *Phil. Zool.* ii. p. 187, 1821; Owen, *Odont.*

t. 128. f. 13; Martin, *P. Z. S.* iv. p. 59, 1836, *Osteology*; Baird,

*M. N. A.* p. 189.

*Enhydrius lutris*, Gray, *Cat. Mamm. B. M.* p. 72; *P. Z. S.* 1865,

p. 136, t. 7 (from life).

*Enhydrius Stelleri*, Lesson, *Män.* p. 156.

*Enhydrius* ? *gracilis*, Fischer, *Syn. Mamm.* p. 229.

*Enhydrius marina*, Hempr. *Licht. Darst. Säuegeth.* t. 19; Eversmann,

*Reise um die Erde*, t. 11, 12; Schrenck, *Amurland*, p. 43.

*Lutra marina*, Lesson, *N. Tab. R. A.* p. 171.

Sea-Otter, Penn., Cook's *Voy.* ii. p. 645; Menzies, *Phil. Trans.* 1796,

p. 385; Rich. *North. Zool.* p. 59.

*Hab.* California.

What is *Lutra lutris*, Geoffroy, F. Cuvier, *Diet. Sci. Nat.* (xxviii. p. 247, t. ), *Lutra marina*, Desm. *Mamm.* p. 189, Schreb. *Säuegeth.* (t. 129), with the feet one-third of the length of the body, from Kamtschatka? Is it a badly described *Enhydrius*?



Section II. DOG-FOOTED CARNIVORA (*CYNOPODA*).

Head elongate. Feet elongate. Toes straight; the last phalange and the claws extended. The claws blunt and worn at the end; the front ones are often more or less elongated, for digging.

## Fam. 7. MELINIDÆ.

Head moderate, elongate. Nose simple, flat and bald beneath, with a central longitudinal groove. Tubercular grinders one on each side of the upper and lower jaws. Feet elongate. Toes straight, exserted. Claws spread out, blunt.

Mustelidæ, § Platypoda, *Gray, P. Z. S.* 1865, p. 102.

The flesh-tooth of this group is peculiar. In some genera it is of the usual normal shape, with a small internal lobe crowned with a single conical tubercle, as in *Mephitis*, *Zorilla*, and *Mellivora*; in *Conepatus* the inner lobe is broader, and has an elongated arched ridge on its inner edge. In some other genera, where the inner lobe is broad, it is crowned with two tubercles; they are distinct and well developed in *Taxidea* and *Helictis*, confluent, forming an oblique ridge, in *Mydaus*, and rudimentary and marginal in *Arctonyx*. The genus *Bassaris* has, like these genera, two conical tubercles on the inner process of the flesh-tooth.

The form of the hinder part, and the position of the hinder opening, of the palate vary in the different genera.

In *Conepatus* and *Mephitis* it is wide and scarcely produced, and nearly in a line with the hinder edge of the grinders.

In *Mellivora* it is wide, but rather further back, in a line with the hinder edge of the orbit.

In *Meles* and *Taxidea* and *Mydaus* it is rather contracted, and placed still further back, being in a line with the middle of the zygomatic arch.

In *Arctonyx* it is produced still further back, the opening being rather behind, in a line even with the condyles; the hinder part of the palate behind the tooth-line is concave below, keeled on the sides above, and swollen on the sides in front.

*Synopsis of the Genera.*

A. Plantigrade. *Hind feet broad, depressed; soles bald, callous nearly to the heel; toes short, thick; claws thick. Body heavy. Tail short. Ears short, rounded.*

Tribe 1. **Melina.** Tubercular grinder large, oblong, elongate. Palate produced behind. Flesh-tooth with two more or less distinct tubercles on inner lobe.



\* *Palate much produced behind ; hinder opening in a line with the condyles.*

1. ARCTONYX. Tubercular grinder elongate. Nose of skull rather produced and contracted.

\*\* *Palate moderately produced behind ; hinder opening in a line with the middle of zygomatic arch.*

2. MELES. Tubercular grinder elongate, oblong. Nose of skull broad. Flesh-tooth moderate, trigonal; inner lobe with a single ridge.
3. TAXIDEA. Tubercular grinder large, triangular, oblong; inner side broad. Flesh-tooth large, trigonal, with a broad inner lobe with two tubercles. Nose short, broad.
4. MYDAUS. Tubercular grinder oblong, nearly square; flesh-tooth moderate, trigonal, outer edge compressed, inner with two unequal tubercles on a ridge. Nose of skull produced.

Tribe 2. **Mellivorina.** Tubercular grinder transverse, band-like; palate only slightly produced behind; flesh-tooth with a small inner lobe and a single tubercle. Fur black below.

5. MELLIVORA. Skull short, broad.

Tribe 3. **Mephitina.** Tubercular grinder oblong, four-sided. Palate scarcely produced behind; hinder opening in a line with the hinder grinders. Skull short. Nose broad. Fur black, white-striped.

6. CONEPATUS. Sole of hind feet only divided across. Tail short, bushy. False grinders 3.
7. MEPHITIS. Sole of hind feet with three pads in front. Tail elongate, flaccid. False grinders 4.
8. SPILOGALE. Sole of hind feet with four pads in front. Tail short, bushy, flaccid. False grinders 4.

B. Subdigitigrade. *Hind feet rather narrow ; soles hairy, with a narrow, elongate, triangular, bald space in front ; toes unequal ; claws elongate, slender. Tubercular grinder transverse.*

Tribe 4. **Zorillina.** Flesh-tooth elongate, with a small anterior inner lobe with a single tubercle.

9. ZORILLA. Tail elongate, with flaccid hair.

Tribe 5. **Helictidina.** Flesh-tooth triangular, having a broad internal lobe with two conical tubercles.

10. HELICTIS. False grinders  $\frac{3}{4}$ . Tail elongate, subcylindrical.

A. Plantigrade. *Hind feet broad, depressed; soles bald, callous nearly to the heel; toes short, thick; claws thick. Body heavy; tail short; ears short, rounded.*

Melina, Gray, *Ann. Phil.* 1825.

### Tribe I. MELINA.

Tubercular grinder large, oblong, elongate; palate produced behind; flesh-tooth with two more or less distinct tubercles on the inner lobe.

Melina, Gray, *P. Z. S.* 1865, p. 137.

a. *Palate much produced behind; hinder opening rather behind, on a line level with the condyles. Nose of skull rather produced.*

#### 1. ARCTONYX.

Arctonyx, *F. Cuvier, Mamm. Lithogr.* p. 51; *Gray, List Mamm. B. M.* xxi. p. 70; *P. Z. S.* 1865, p. 137.  
*Synarchus, Gloger, 1842.*

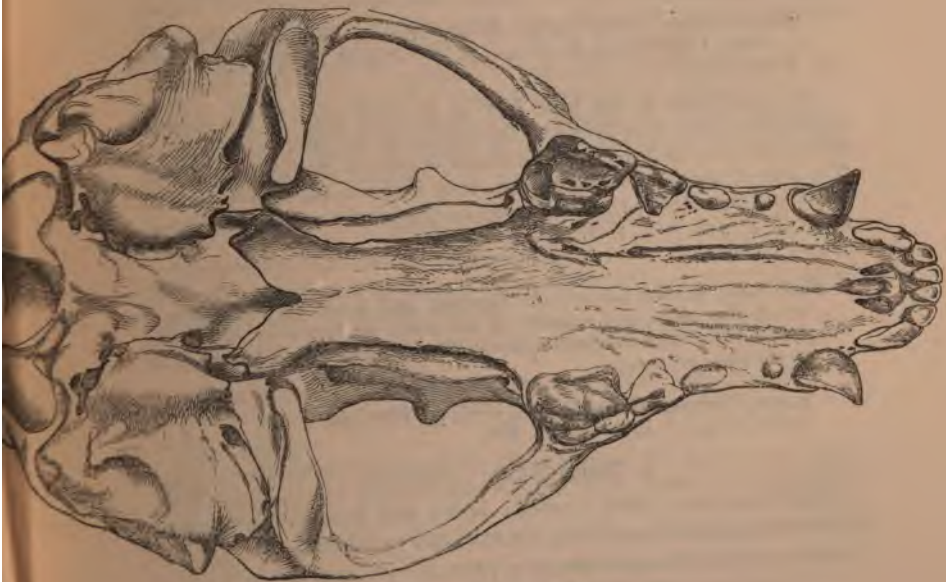
Skull elongate, broad and truncated behind. Nose elongate, rather compressed, rounded above. Forehead elongate, rounded on the sides. Orbits small, oblong, very incomplete behind; zygomatic arch strong, wider behind; the suborbital foramen circular; the palate concave in front, much produced behind, concave below, prominent and keeled on the sides; hinder opening far back, in a line with the condyles of the lower jaw; opening angular, acute in front; the bulla of the ear oblong, scarcely raised; the tube of the inner nostril vesicular and very thin at the sides. The cutting-teeth unequal, truncated, worn; the two middle ones smallest; the second on each side rather larger; the lateral pair much larger, very oblique. Canines conical, compressed, nearly straight, worn on the front edge, bent out at the end. False grinders 4; the first very small, sub-cylindrical, separated by a long diastema; the second compressed, trigonal. The flesh-tooth moderate, triangular, nearly as wide in front as the outer side; the outer edge with a compressed tubercle; inner lobe with two small compressed marginal ridges. Tubercular tooth four-sided, massive, rather longer than broad, truncated in front, and obliquely truncated at the outer hinder side; outer edge with two compressed tubercles. Lower jaw elongate, produced and flattened in front. Cutting-teeth unequal, much worn, rather produced in front. Canines compressed, curved, worn on the front edge. False grinders 2, separated from the canines by a large diastema, compressed. The flesh-tooth large, elongate, oblong-ovate, with two conical tubercles in front, and two pairs of tubercles behind. Tubercular grinder circular.

*Arctonyx collaris.* (Balisoar.)

B.M.

Yellowish, black-washed; throat yellow; feet and a double streak

Fig. 18.



Skull of *Arctonyx collaris*.



on each side of the head black; tail elongate; ears very short, white-edged.

*Meles taxus*, *Hardw. MS. B. M.* (!)

*Arctonyx collaris*, *F. Cuv. Mamm. Lith.* t. 51 (from *Hardwicke's Drawing*); *Gray, P. Z. S.* 1865, pp. 138, 681 (fig. skull).

*Arctonyx taxoides* (Balisoar), *Blyth, Journ. Asiat. Soc. Beng.* p. 589.

*Arctonix*, *Evans, J. A. S. B.* vii. t. 43.

*Mephitis assamensis*, *McClelland, Ind. Rev.* 1858, p. 309.

*Meles collaris*, *Ogilby, Penny Encyc.* iii. p. 264.

*Mydaus collaris*, *Gray, Illust. Ind. Zool.* t.

*Arctonyx isonyx*, *Hodgs. P. Z. S.* 1856, p. 398, t. 50.

Sand-Bear, *Bewick's Quad.* p. 257.

*Hab.* Assam and Arakan.

I can find no difference between the specimen of *A. isonyx* (Hodgson, *P. Z. S.* 1856, t. 50) and *A. collaris*.

b. *Palate moderately produced behind; hinder opening on a line level with the middle of the zygomatic arch.*

## 2. MELES.

Head pointed; nose prominent; ears rounded. Body thick, heavy. Limbs short; front claws elongate, for digging. Tail short. Skull elongate, rounded behind; orbits incomplete, only contracted above. Teeth 36; false grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ . Flesh-tooth moderate-sized, triangular. Tubercular grinder very large, four-sided, oblong, rather longer than broad.

*Meles*, *Gesner, Quad.; Briss. R. A.; Nilsson, Skand. Faun.* p. 182;

*Gray, List Mamm. B. M.* xxi. p. 70; *P. Z. S.* 1865, p. 138.

*Taxus*, *Cuvier*.

The bald soles of the hind feet of *Taxidea leucurus* are oblong, occupying about two-thirds of the length of the foot, hairy behind, with four pads in front; the front and outer one smaller, triangular. The sole of the fore foot is oblong, with four unequal-sized pads in front and one oblong transverse one on the hinder margin (*Hodgson, J. A. S. B.* xvi. p. 2, t. 31. f. 4).

\* *Skull ovate, swollen behind; the forehead and upper part of the nose broad, flat above, and rounded on the sides; the face short, thick; the flesh-tooth of the lower jaw moderate, shorter than the tooth-line occupied by the three premolars.*

*Taxus*, *Eumeles*, *Gray, P. Z. S.* 1865, pp. 139, 140.

*Meles*, *Gray, P. Z. S.* 1868, p. 206.

### 1. *Meles taxus*. (Badger.)

B.M.

Yellowish grey, black-washed; limbs and beneath black; face white, with a streak enclosing the eyes and ears black.

*Ursus taxus*, *Blumenb. Handl.* p. 10.

*Ursus meles*, *Linn. Syst. Nat.* i. p. 70; *Schreb. Säugeth.* p. 516.

- Meles taxus*, *Boddaert*, *Elench.* i. p. 80; *Schreb.* *Säugeth.* t. 142;  
*Blainv. Ostéogr.* Subursus, t. 2 (skeleton), 6 (skull), 9 (teeth);  
*Gray*, *P. Z. S.* 1865, p. 139; 1868, p. 207.  
*Meles europæus*, *Desm. N. Dict. Hist. Nat.* iii. p. 465.  
*Meles vulgaris*, *Desm. Mamm.* p. 173.  
*Taxus vulgaris*, *Tiedm. Zool.* i. p. 376.  
*Blaireau*, *Buffon*, *H. N.* vii. p. 104, t. 7, 8.  
*Blaireau d'Europe*, *Cuvier*, *R. A.* i. p. 145.  
*Common Badger*, *Penn. Brit. Zool.* p. 30; *Bell, Brit. Quad.* p. 122.

*Hab.* North Europe; North Asia.

Skull ovate-elongate; face large; forehead flat; nose broad, flat above; orbits incomplete; supraorbital hole large, subquadrangular; brain-case ovate, narrow behind, obliquely truncated; palate rather concave, flat and produced behind, with a sharp keeled ridge on each side behind; the hinder aperture angular in front, in a line with the middle of the zygomatic arch. Cutting-teeth large, subequal, truncated. Canine conical, slightly curved. False grinders 2; front small, conical; second larger, compressed. Flesh-tooth moderate, trigonal, sides subequal, outer edge with two conical tubercles, outer lobe with two indistinct minute tubercles on the edges. The tubercular grinder large, massive, rather longer than broad, front edge concave, hinder rounded, obscurely truncated on the outer hinder margin, outer margin with three unequal slightly raised tubercles. Lower jaw strong; chin arched; cutting-teeth truncated, unequal, the middle one on each side rather behind the others; canines conical, short, curved; false grinders 3, first very small, deciduous; second and third compressed, conical; flesh-tooth oblong, elongate, with three tubercles in front and two pairs of tubercles behind; tubercular grinder small, ovate.

Length of skull 5" 3"', of nose 9"', of palate 2" 11"', of lower jaw 3" 9"'; width over ears 2" 3"', of nose in front of orbits 1" 4"'.

Skull large; face very broad and rounded in front; the nasal aperture large, broad, as broad as high, postorbital aperture moderate, subcircular.—*Gray*, *P. Z. S.* 1868, p. 206.

## 2. *Meles anakuma*, Temm.

Skull small; face broad, tapering, narrow, and rounded in front; the nasal aperture oblong, moderate, higher than broad; the postorbital opening very large, oblong.

*Meles anakuma*, *Temm. Fauna Japonica*, t.; *Gray*, *Proc. Zool. Soc.* 1853, p. 191; 1865, p. 139.

*Meles taxus*, var., *Middendorff*, *N. und O. Sibir. Säugeth.* p. 3.

*Meles taxus*, var. *amurensis*, *Schrenck*, *Amurland*, xvii. t. 1. f. 1, 4.

*Hab.* Japan.

The skull differs from that of *M. taxus* and *M. leucurus* in being much shorter, and with a rather broad nose (*Gray*, *P. Z. S.* 1853, p. 191).

The skull is well figured by *Temm. & Schlegel*, *Fauna Japonica*, t. 6. The name of this animal is erroneously printed *M. ankuma*, in *P. Z. S.* 1865, p. 140.



\*\* *The skull oblong, elongate; the forehead and upper part of the nose narrow, subcylindrical above; face elongate, tapering, rounded in front; nose-hole moderate, rounded, as broad as long; the flesh-teeth of the lower jaw large, longer than the line occupied by the three premolars. Pseudomeles, Hodgson.*

### 3. *Meles leucurus*. (Tampha or Tumpha.)

Fur long, flaccid, dark iron-grey, black, grey, and white mixed; hair long, white, with a broad sublunate black band and a white tip; under-fur abundant, long, white; a streak on each side of the forehead blackish-grey-varied; chin, throat, legs, and underside of body black; tail, sides of head, and body whitish.

*Taxidea leucura*, Hodgson, *Journ. A. S. Beng.* xvi. p. 763, t. 31, 1847;

*Gray, Ann. & Mag. N. H.* xii. p. 221, 1853.

*Pseudomeles leucurus*, Hodgson, *MS.* 1850.

*Meles leucurus*, Gray, *P. Z. S.* 1853, p. 191; 1857, p. 768; 1865, p. 139; 1868, p. 207; *Horsf. Ann. & Mag. N. H.* xvi. p. 108, 1855.

*Taxidea leucurus*, Hodgson, *P. Z. S.* 1847, p. 116.

*Hab.* Thibet, "Bhote Plains:" called Tampha (Hodgson).

Very like *Arctonyx collaris*; but the fur of the back is longer and more flaccid, and the chin and throat are black, as well as the belly and legs, which is not the case in that animal. The skull is rather more tapering and more compressed than in the European Badger (*M. taxus*), which it most resembles.

Consult also *Meles albigularis*, Blyth, *Journ. Asiat. Soc. Beng.* 1843, p. 589, which is unknown to me.

As I observed in the 'Proc. Zool. Soc.' 1865, p. 140, the skin is very like that of *Arctonyx collaris*, but differs in the chin and throat being black, and in the black streak on the face commencing on the side of the front of the nose, including the eyes.

### 4. *Meles chinensis*.

Fur short, harsh, yellow-brown, varied with black and grey; tips of the breast-hairs rigid, moderately short, yellow, with a narrow black subterminal ring and yellow tip; under-fur almost entirely absent.

Streak from end of nose on each side of the face, including the eye, the back of the ears, chin, throat, legs and feet, and underside of the body black; tail slender, harsh, yellow; some of the hair of the upper part with a black subterminal ring.

*Arctonyx collaris*, no. 206, c, Gerrard, *Cat of Bones B.M.* p. 98.

? *Meles taxus amurensis*, Schrenck, *Amurland*, xvii. t. 1. f. 1-4.

*Meles chinensis*, Gray, *P. Z. S.* 1868, p. 207.

? *Meles leptorhynchus*, A. Milne-Edwards, *Ann. Sc. Nat. sér. 5.* viii. (not described).

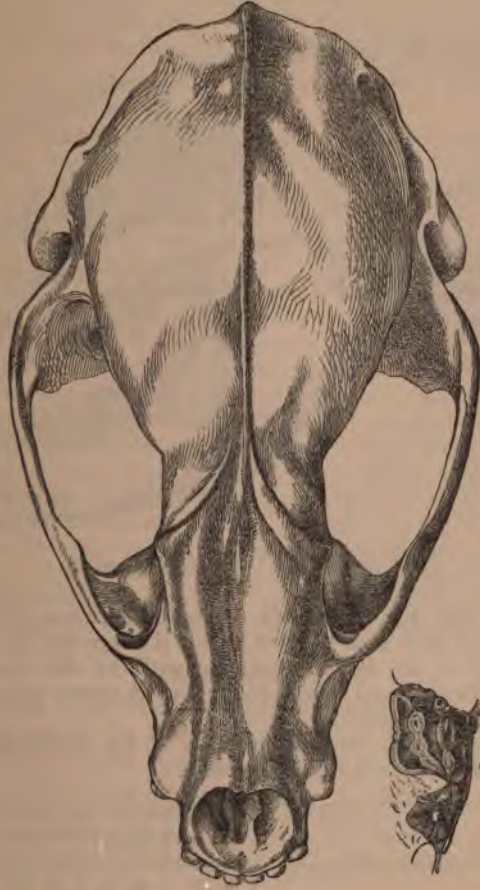
*Hab.* China, Hongkong (Dr. Hartland), Amoy (*H.M.C. Swinhoe*).

The general colouring is so like that of the European Badger that it is probably the *M. taxus*, var., of Middendorff (*N. u. O. Sibir. Mamm.* p. 3), and *Meles taxus*, var. *amurensis*, Schrenck, *Amurland*,



xvii. t. 1. f. 1-4; but the fur is much shorter, and the hair not so distinctly variegated as that of the European Badger, and very much harsher.

Fig. 19.



*Meles chinensis.* a. Hinder upper grinders.

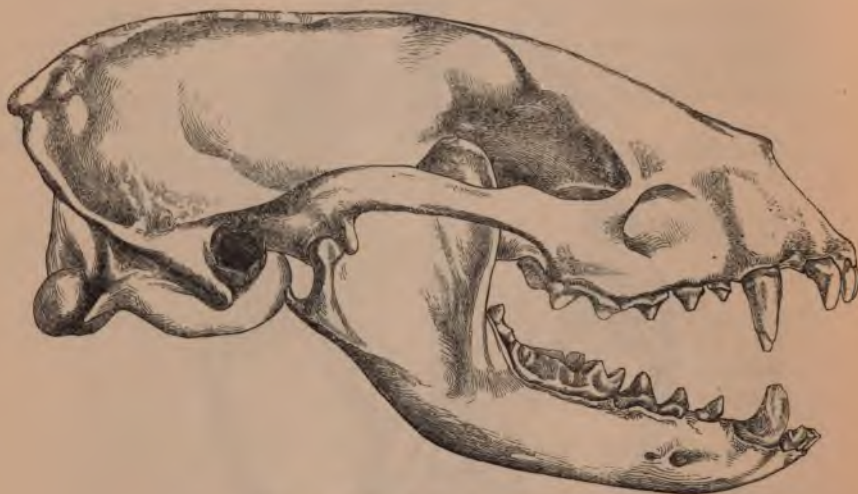
The skull (figs. 19, 20) is so like that of *Meles leucurus* from Thibet, that I should have regarded them as the same, if there were not so much difference in the length and flaccidness and coloration of the fur, and the abundance of the under-fur. This may depend on the climate.

The shortness and peculiar colour of the fur are exactly alike in

the specimens sent by Dr. Hartland from Hongkong and by Mr. Consul Swinhoe from Amoy.

I may observe that when Dr. Hartland's specimen was sent it was regarded as a young *Arctonyx collaris*.

Fig. 20.



Side view of skull of *Meles chinensis*.

I cannot see any appreciable difference between the skull of *Meles leucurus* from Thibet, given to the Museum by Mr. Hodgson, and the skull of the *M. chinensis*, sent with the skin from Amoy. Dr. Hartland's specimen is very young, but it agrees with the other two skulls in all particulars.

The following are the measurements of the skulls of the four species of *Meles* in the British Museum:—

	<i>M. taxus.</i>	<i>M. anakuma.</i>	<i>M. leucurus.</i>	<i>M. chinensis.</i>
	in. lin.	in. lin.	in. lin.	in. lin.
Length, entire .....	4 9	4 8?	4 9	4 4
— from nose to front of orbit ...	1 9	1 6	1 8	1 4½
— of zygomatic arch.....	2 5	2 0	2 2	2 1
— of lower jaw .....	3 4	2 9	3 0	2 10
Width of nose in front of line of orbital apertures .....	1 3	1 0	1 0	0 10
— at back part of zygomatic arch	3 0	2 7	2 8	2 5
— of occipital end.....	1 10	2 0	2 2	2 0
— of forehead between orbits ...	1 2	0 11	1 0	0 10

## 3. TAXIDEA. (American Badger.)

Nose prominent. Ears rounded. Body heavy, stout. Limbs short. Feet plantigrade. Toes 5/5; front claws elongate, for digging. Tail short. Fur soft, with longer hairs. Skull broad, depressed, and truncated behind. Teeth 34; false grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ . Flesh-tooth very large, triangular. Tubercular grinder triangular, not exceeding the flesh-tooth in size (see P. Z. S. 1853, p. 191).

Taxidea, Waterhouse, *Trans. Zool. Soc.* ii. p. 343, t. 59, 1841; Gray, *P. Z. S.* 1865, p. 140.

Skull depressed, subtriangular, broad and truncated behind; nose short, broad; forehead small and slightly convex; suborbital foramen small, trigonal; orbits incomplete behind. Palate flat, rather produced behind; hinder opening arched, not so wide as the side margin. The auditory bulla large, convex, half ovate, vesicular, thin. The cutting-teeth short, strong; four central truncated, outer large, conical. Canines conical, nearly straight. False grinders two, conical; the hinder larger, with a thickened margin on the inner hinder edge. Flesh-tooth large, triangular, nearly as broad in front as on the outer side; outer side with two compressed confluent tubercles; inner side broad, with two conical tubercles, the hinder small. The tubercular tooth large, broad, subtrigonal, the inner edge long, the outer short, the hinder edge obliquely truncated. Lower jaw strong; condyles transverse; cutting-teeth in a close line, two middle small, two next larger, and outer largest, the four outer obliquely truncated; canines conical, curved; false grinders three, the first and second small, conical, third compressed, with two confluent tubercles, outer edge thin; flesh-tooth oblong, with a single large tubercle in front and two pairs of others, the hind pair curved; tubercular tooth subconical, with three tubercles.

*Taxidea americana.*

B.M.

Grey, black- and white-varied; neck and beneath white; spot before the ears, a narrow streak from nose, above the eyes, to the back, black; feet dark brown.

*Ursus taxus*, Schreb. *Säugeth.* p. 520, t. 142; Buffon.

*Meles taxus*, var. *americana*, Bodd. *Elench.* i. p. 136.

*Meles americanus*, Zimm., from Penn. *Arct. Zool.* i. p. 76.

*Ursus labradorius*, Gmelin, *S. N.* i. p. 102; Shaw, *Zool.* i. p. 460, t. 106.

*Meles labradoria*, Sabine, *App. Parry's Travels*, p. 649; Richardson, *Fauna Bor.-Amer.* p. 40; Fischer, *Syn. Mamm.* p. 151.

*Meles Jeffersonii*, Harlan, *F. Amer.* p. 309.

*Taxidea labradoria*, Waterh. *Trans. Zool. Soc.* ii. p. 348, t. 59; Gray, *List Mamm. B. M.* p. 70; Gerrard, *Cat. Bones, B. M.* p. 99; Baird, *Mamm. N. A.* p. 202, t. 39, f. 2.

*Meles labradorius*, Schinz, *Syn. Mamm.* p. 315.

*Taxus labradorius*, Say, *Long's Exped.* i. pp. 261 & 369, 1823.

Carcajou, Buffon, *N. H. Supp.* iii. p. 242, t. 49 (not *La Houtan*).

*Taxidea americana*, Baird, *Mamm. N. A.* p. 202; Gray, *P. Z. S.* 1865, p. 141.



American Badger, *Penn. Syn.* p. 204.

? Brairo (*French Canadians*), *Lewis & Clarke, Trav.* ii. p. 40.

Siffleur, *French Canadians*.

Flacyotl, *Hernandez*.

Var. *Berlandieri*. Smaller; reddish above, with a narrow white dorsal streak.

*Taxidea Berlandieri*, *Baird, Mamm. N. A.* p. 205, t. 39. f. 1 (Mexico).

Var. *californica*, pale line continued from nape to base of tail (Bennett, *P. Z. S.* 1833, p. 42). (Skull, B.M.)

*Hab.* California (*David Douglas*); Texas (skull, B.M.).

	in.	lin.
Length of skull .....	4	10
—— of nose .....	1	3½
—— of palate .....	2	6
—— of orbit and zygoma .....	2	5
Width of skull over ears .....	2	6
—— of nose at orbits .....	1	3
—— of skull behind .....	3	0
Length of lower jaw .....	1	5

#### 4. MYDAUS.

Head conical. Nose attenuated. Muzzle rather produced, mobile, obliquely truncated; beneath rather bald, with a distinct central longitudinal bald groove. Nostrils inferior, lateral. Body short; limbs short. Feet plantigrade, soles broad, bald to the heel. Toes 5.5; front claws elongate, strong, unequal; hinder strong, rather acute. Tail short; anal glands distinct. Skull elongate; orbit not contracted behind. Teeth 34; grinders  $\frac{4}{5}$ .  $\frac{4}{5}$ ; false grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ ; one-rooted (Blainv. *Ostéogr. Subursus*, t. 1).

*Mydaus*, *F. Cuv.*; *Gray, Cat. Mamm. B. M.* xxi. p. 69; *P. Z. S.* 1865, p. 143.

*Mephitis*, sp., *Desm.*

*Mydaon*, *Gloger*, 1842.

Skull elongate, slender in front; nose elongate, tapering, shelving on the sides; orbit very incomplete, small; suborbital foramen moderate, ovate, zygomatic arch flattened, slender; brain-case ovate, ventricose, truncated behind; palate slightly concave, especially in the middle behind; hinder opening to the nostrils ovate, in a line with the middle of the zygomatic arch; bulla of the ears low, slightly convex. The cutting-teeth broad, in an arched line, truncated, the outer ones rather the largest, with a slight notch in the hinder edge; canine compressed, far from the cutting-tooth; false grinders two, the first small, second compressed; the flesh-tooth roundish, trigonal, outer edge with a compressed marginal tubercle, inner lobe broad, rounded, with two conical tubercles, the hinder small, and united to the ridge on the outer margin; the tubercular grinder oblong subrhombic, rather longer than wide, the front and

hinder edges obliquely truncated, with two compressed tubercles on each edge, the inner tubercle largest. Lower jaw rather slender; chin flattened, shelving; the cutting-teeth truncated, the middle on each side rather behind the rest; canine curved; false grinders three, compressed, the front small, the third with a conical lobe on the hinder edge; the flesh-tooth oblong, with three compressed tubercles on each edge; the hinder outer and the front inner being the largest and single, the front outer and hinder inner lobe being double-coned; tubercular grinder moderate, circular.

Length of skull 3" 2", palate 1" 7", of lower jaw 2", of nose 1", width of brain-case over ears 1" 4½", of nose at front of orbits 9".

#### **Mydaus meliceps.**

B.M.

Brown; crown, nape, dorsal streak, and tip of a very short tail white.

Var. *a.* Dorsal streak broad in front, and continued to tip of tail. B.M.

Var. *b.* Streak interrupted on withers, narrow behind; tip of tail white. B.M.

Var. *c.* Streak dilated into a broad patch over the withers, narrow behind; tail, great part white. B.M.

*Ursus fetidus*, Desch. *MS. Icon. in B. M.*!

*Mydaus meliceps*, *F. Cuvier, Mamm. Lith. t.; Horsf. Java, t.; Cuvier, Oss. Foss. iv. p. 474; Gray, P. Z. S. 1865, p. 142.*

*Mephitis javanensis*, *Desm. Mamm. p. 187.*

*Mydaus javanicus*, *Blainv. Ostéogr. Subursus, t. 1 (skeleton).*

*Mydaus javanensis*, *Blainv. Ostéogr. Subursus, t. 7 (skull), t. 9 (teeth).*

*Stinkard or Teledu, Marsden, Sumatra, p. 117.*

*Hab. Sumatra (Raffles).*

### **Tribe II. MELLIVORINA.**

Tubercular grinder transverse, band-like; palate only slightly produced behind; flesh-tooth with a small internal lobe, with a single tubercle. Fur black below, white above.

*Mellivorina*, *Gray, P. Z. S. 1865, p. 143.*

#### **5. MELLIVORA.**

Head depressed; nose blunt; ears indistinct. Body stout, depressed; legs short, strong; plantigrade. Toes 5.5; front claws elongate, very strong, the bald sole of hind foot occupying the whole undersurface, only slightly divided across about one-third of its length from the front (*Hodgson, J. A. S. B. t. 31. f. 2*). Tail short, subcylindrical. Skull contracted behind; orbits very incomplete, scarcely contracted behind. Teeth 32; premolars  $\frac{3}{4}$  .  $\frac{3}{4}$ ; grinders  $\frac{4}{4}$  (*Blainv. Ostéogr. Mustela, t. 2*).



*Mellivora*, *Stor.*; *F. Cuv.*; *Gray, L. M. B. M.* v. p. 68; *P. Z. S.* 1865, pp. 143, 680.  
*Ratelus*, *Gray, Ann. Phil.* 1825; *Schinz, Syn.* p. 329.  
*Lipotus*, *Sundevall, Kong. Vet. Akad. Handl.* 1841, p. 211.  
*Ursitaxus*, *Hodgson, Asiat. Research.* xix. p. 60, 1836.  
*Melitonys*, *Gloger*, 1842.

De Blainville figures the skull and teeth of *M. indica* and *M. capensis*, t. 11 and t. 13; he represents the tubercular grinders of *M. indica* as much smaller than those of *M. capensis*, and the flesh-tooth as more unequally triangular (see t. 13).

# 1. *Mellivora indica*. (Bharsiah.)

B.M.

Black; the back iron-grey; crown of head white.—*Gray, P. Z. S.* 1865, p. 680.

*Ursus indicus*, *Shaw, Zool. i.* p. 470, 1800.  
*Meles indica*, *Fischer, Syn. Mamm.* p. 151.  
 Indian Badger (*Ursus indicus*), *Hardw. Linn. Trans.* ix. p. 115, t. 9.  
 Indian Badger, *Penn.*  
*Ratelus mellivorus*, *Benn. Zool. Gard.* p. 13 (fig. good).  
*Mellivora ratel*, *Gerrard, Cat. Bones B. M.* p. 96.  
*Mellivora ratelus* (Indian var.), *Fraser, Cat. Zool. Gardens*, 1862, p. 9; *Bartlett, P. Z. S.* 1835.  
*Ratelus indicus*, *Schinz; Burton, P. Z. S.* 1835, p. 113.  
*Mellivora indica*, *Blainv. Ostéogr. Mustela*, t. 6 (skull); *Gray, P. Z. S.* 1865, pp. 143, 680; *Sclater, P. Z. S.* 1867, p. 98.  
*Mustela indica*, *Blainv. Ostéogr. Mustela*, t. 13 (teeth).  
*Ursitaxus inauritus* (Bharsiah), *Hodgson, Asiat. Research.* xix. p. 60, *J. A. S. Beng.* 1836, p. 671.

*Hab.* India (called "Beejoo"), Nepaul (called "Bharsiah").

Skull ovate, elongate; nose short, concave on the sides, flat above; forehead short, convex; orbits incomplete; suborbital foramen small, ovate. Brain-case swollen behind and truncated. Palate nearly flat in front, concave behind and slightly produced; hinder opening of the palate large; keeled on the sides, front edge arched; as wide as long. Four middle cutting-teeth equal, truncated, the side ones conical, with a recurved tip; canines conical, nearly straight; false grinders two, crowded, thick, conical: flesh-tooth trigonal; outer edge rather the longest, with two conical confluent tubercles; the inner lobe anterior, roundish, with an acute conical tubercle: tubercular grinder transverse, band-like; outer half narrow, inner half considerably wider, rounded on the inner edge. Lower jaw strong; chin arched; cutting-teeth crowned, truncated, the middle one on each side behind the others; canines conical, curved back; false grinders three, rather crowded, thick, conical; the flesh-tooth oblong, of moderate size, with three conical tubercles in a single longitudinal series; tubercular grinder none (or small or early deciduous).

	in.	lin.
Length of skull .....	5	4
——— palate .....	2	4
——— lower jaw .....	3	6
——— orbit over ears .....	2	3
——— nose in front of orbits .....	1	5½



The skull is very like *Gulo* in general form; but the upper flesh-tooth is triangular, and the larger internal lobe in *Gulo* is oblong, longitudinal, with a small internal lobe near the front end.

## 2. *Mellivora ratel*. (Ratel.)

B.M.

Black; the back iron-grey; the crown and a broad streak down each side to the tail white.—*Gray, P. Z. S.* 1865, p. 680.

Known from *M. indica* by the greater quantity of white on the head and the broad white lateral edge to the iron-grey colour on the back. Skull higher.

*Gulo capensis*, *Desm. Mamm.* p. 176.

*Ursus mellivorus*, *Cuv. Tab. Élém.* p. 112, 1798.

*Viverra capensis*, *Schreb. Säugeth.* p. 450, t. 135.

*Viverra ratel*, *Sparrm. Act. Stockh.* 1777, t. 4. f. 2.

*Mellivora capensis*, *F. Cuv.; Blainv. Ostéogr. Mustela*, t. 6 (skull), t. 2 (skeleton); *Sclater, P. Z. S.* 1867, p. 98.

*Mellivora ratel*, *Gray, List Mamm. B. M.* p. 68; *P. Z. S.* 1865, pp. 145, 680.

*Viverra mellivora*, *Blumenb. Naturg.* p. 97.

*Ursus mellivorus*, *Blumenb. Naturg.* edit. 10, p. 99.

*Taxus mellivorus*, *Tiedem. Zool.* i. p. 377.

*Lipotus mellivorus*, *Sundevall, Kong. Vet. Akad. Handl.* 1841, p. 211.

*Mellivora capensis*, *Peters.*

*Ratelus capensis*, *Schinz.*

*Meles mellivora*, *Thunb. in Mém. Pétersb.* iii. p. 107.

*Ratelus typicus*, *A. Smith.*

*Mustela capensis*, *Blainv. Ostéogr. Mustela*, t. 13. f. (teeth).

*Stinkbinksen*, *Kolbe.*

*Blaireau puant*, *La Caille, Voy.* p. 182.

*Fizzler Weasel*, *Penn. Syn.* p. 224.

*Honey-Weasel*, *Shaw, Zool.* i. p. 395.

*Ratel*, *Sparrm. Kong. Vet. Akad. Handl.* 1777, p. 49, t. 4. f. 3.

*Hab.* South Africa (*Sparrman*); East Africa, Sennaar (*Sundevall*); Tette (called "Seve," *Peters*).

## 3. *Mellivora leuconota*.

Smaller: black; back white, purer towards the crown.

*Mellivora leuconota*, *Sclater, P. Z. S.* 1867, p. 98, t. 8.

*Hab.* West Africa. Zoological Gardens. Smaller than *M. ratel*.

Mr. Sclater, when describing this species, copied my specific characters for the two known ones (see *P. Z. S.* 1865, p. 680; 1867, p. 98).

## Tribe III. MEPHITINA.

Tubercular grinder oblong, quadrangular. Palate scarcely produced behind, nearly in a line with the hinder end of the tooth-line. Fur black, white-streaked. Skull short.

*Mephitina*, *Gray, P. Z. S.* 1865, p. 145.

The flesh-tooth in the three genera which Lichtenstein and most compilers have kept together under the name of *Mephitis* differs

very considerably. In *Mephitis* and *Conepatus* it is short and broad; in *Mephitis* the inner lobe has a conical tubercle, and in *Conepatus* it has a long, marginal, semilunar one. In *Zorilla* the flesh-tooth is elongate, slender, much longer than broad, and it has a conical tubercle on its subcentral small inner lobe. The tubercular grinder in the first two genera is broad, massive, and square; in *Zorilla* it is oblong and transverse.

## 6. CONEPATUS.

Head conical; nose produced, hairy, and without any central groove beneath; muzzle produced, bald above, obliquely truncated beneath; nostrils inferior; ears orbicular, scarcely visible. The hind feet large, broad; the soles naked, half the length of the foot, oblong, broad, rugose and warty, rounded behind, divided into two convex parts by a cross groove, scarcely subdivided into smaller pads; front claws very long. Tail short, bushy, subcylindrical. Teeth as in *Mephitis*. Teeth 32; false grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ ; but flesh-tooth with long, marginal, semilunar tubercle.

*Conepatus*, Gray, *Mag. Nat. Hist.* 1837; *P. Z. S.* 1865, p. 145.

*Marputius*, Gray, *Mag. Nat. Hist.* 1837, i.

*Thiosmus*, Licht. *Abhand. Akad. Berl. für* 1836, p. 214, published 1838.

*Lycodon*, D'Orbigny.

*Ozolictus*, Gloger, 1842.

It has been supposed that Lichtenstein has the priority for the subgenus *Thiosmus*, because the paper appears nominally in the 'Transactions' for 1836, and my paper in the 'Mag. Nat. Hist.' 1837; but there cannot be a doubt that my paper was anterior, for Lichtenstein quotes it throughout.

### *Conepatus nasutus*.

B.M.

Black, with one or two white dorsal streaks. Tail short, bushy, white or white-and-black varied.

*Conepatus nasutus*, Gray, *P. Z. S.* 1865, p. 145.

Var. 1. *nasuta*. Black, with a very broad white dorsal streak; from forehead to tail white.

B.M.

*Mephitis nasuta*, Bennett, *P. Z. S.* 1833, p. 39; Gray, *Mag. N. H.* 1837, i.; Fraser, *Zool. Typica*, t.

*Mephitis mesoleuca*, Licht. *Ab. Akad. Berl.* 1838, p. 271; *Darstell.* t. 44. f. 2.

*Thiosmus mesoleuca*, Less.

*Marputius nasuta*, Gray, *Mag. N. H.* 1837, i.

*Viverra putorius*, Mutis, *Act. Holm.* 1769, p. 68.

*Viverra marputio*, Gmelin, *S. N.*

*Mephitis* (*Thiosmus*) *marputio*, Licht. *Abh. Ak. Berl.* 1836, p. 270.

*Mephitis* (*Thiosmus*) *leuconota*, Licht. *Abh. Akad. Berl.* 1836, p. 270 (1838).

*Mephitis intermedia*, Saussure, *Rev. Zool.* 1860, p. 6.

*Mephitis mesoleuca*?, Tomes, *P. Z. S.* 1861, p. 280.



*Mephitis longicaudata* ? *Tomes, P. Z. S.* 1861, p. 280.

The Chinche (*Viverra chingu*), *Molina, Essai H. N. du Chili*, p. 240.

*Hab.* Mexico ; New Granada ; Santa Fé de Bogotá ; California.

The *Mephitis* (*Thiosmus*) *Molinae*, *Licht. l. c.* p. 272, with the white dorsal streak broken into five oval spots, is probably only an accidental form of this variety.

Var. 2. *Humboldtii*. Black or blackish brown, with a very broad dorsal streak, like var. 1, with a narrow black streak up the centre of the back, widest in the middle. B.M.

*Conepatus Humboldtii*, *Gray, Mag. Nat. Hist.* i. p. 581, 1837.

*Mephitis Humboldtii*, *Blainv. Ostéogr.* *Mustela*, t. 13. f. (teeth).

*Conepatus Humboldtii*, *Owen, Odont.* t. 11, 12.

*Mephitis patagonica*, *Licht. Abhandl. Akad. Berl.* 1836, p. 275, t. (1838).

? *Mustela* (*Lyncodon*) *patagonica*, *D'Orb. Voy. Amér.* ix. t. 13. f. 4 (skull).

? *Mephitis Westermanni*, *Reinhardt, K. D. Vidensk. Selsk. Forh.* 1856, p. 270.

*Mephitis coneplate*, *Desm., Waterh. Cat. Zool. Soc. Mus.* pp. 29, 176.

*Yaguare*, *Maikel, Falk. Patagon.* p. 128.

*Hab.* Magellan Straits.

B.M.

Var. 3. *chilensis*. Black ; back with two broad white streaks, which are confluent on the forehead and continued to the tail ; tail black and white. In one specimen the lateral streaks are narrow, interrupted on the side of loins, and in another, very young, narrow and not united on the forehead. B.M.

*Conepatus Humboldtii*, var., *Gray, Mag. N. H.* i. p. 581, 1837 (!). B.M.

*Conepatus amazonicus*, *Gray, List Mamm. B. M.* p. 69, 1842 (!). B.M.

*Mephitis fureatus*, *Wagner, Schreb. Säugeth. Suppl.* ii. p. 129.

*Mephitis chilensis*, *F. Cuv. Dict. Sci. Nat.* xiii. p. 126.

*Mephitis suffocans*, *Illiger, Licht. Darstell.* t. 48.

*Mephitis* (*Thiosmus*) *amazonica*, *Licht. Abhand. Akad. Berlin für* 1836, p. 275, t. (1838) (!). Type, B.M.

*Mephitis* (*Thiosmus*) *chilensis*, *Licht. Abhand. Ak. Berl.* 1838, p. 272 ; *Gray, P. Z. S.* 1848 (!). B.M.

*Mephitis* (*Thiosmus*) *quitensis*, *Licht. l. c.* p. 273.

*Gulo quitensis*, *Humb. Obs. Zool.* p. 346.

*Moufette du Chili*, *Buffon, H. N. Suppl.* vii. p. 233, t. 57.

*Mephitis* of Chili, *Griffith, A. K.* ii. t.

*Conepatus chilensis*, *Gerrard, Cat. Bones B. M.* 97 (!). B.M.

*Marpotius chilensis*, *Gray, Mag. Nat. Hist.* 1837, i. (!) B.M.

*Hab.* Chili (*Bridges*, B.M.) ; Magellan Straits (*King*, B.M.).

Buffon's figure represents the tail too long and broad ; it is a subcylindric tuft only, not so long as the body without the head.

Var. 4. *Lichtensteini*. Black ; crown and nape with a broad white blotch, separated behind into two narrow nearly parallel white streaks on the middle of the back, reaching nearly to the loins ; tail, end-half white. B.M.

*Hab.* Tropical America.

This specimen is much distorted in stuffing ; the tail is elongated



by the stretching out of the hinder part of the body, so as to make it look like a *Mephitis*, for which the stuffer evidently mistook it.

From the examination of the stuffed and unstuffed skins, I have considered all the specimens we have in the British Museum to be varieties, because the differences in the coloration appear to pass into one another; but when we have the power to compare the living animal and the skeleton of each, we may discover that some of them are distinct species, having a peculiar geographical range.

Professor Lichtenstein notices another species, under the name of *M. Gumilla*, on the authority of a notice of Skunk called "Maskutio" and "Mafutiliqui" in Gumilla's 'Orinoko' (vol. ii. p. 276), which is said to have many decurrent streaks and a villous tail.

### 7. MEPHISIS.

Nose short, underside hairy, with a distinct central groove; muzzle small; ears ovate, hairy, exposed. Hind feet moderate, subplantigrade; sole bald nearly or quite to the heel, the front portion divided into three large pads, placed in an arch; front claws elongate, arched, strong, white. Tail elongate, as long as, or longer than the body, with long, flaccid, dependent hair. Skull ovate; orbit incomplete. Teeth 34; false grinders  $\frac{2}{3}$ ; upper tubercular grinder small, moderate-sized.

*Mephitis*, Gray, *P. Z. S.* 1865, p. 147.

*Mephitis*, § 1, Gray, *Mag. N. H.* 1837.

"The fœtid liquid is secreted by two glands, which empty directly into the rectum, and are enveloped in a thick muscular membrane, the contraction of which causes the ejection of the fluid to a considerable distance; it is said, however, to be restrained by holding the animal up by the tail; when first discharged, it is said to be phosphorescent at night."—*Baird*, *Mamm. N. A.* p. 191. See also "Anal Pouches of the *Mephitis americana*," Warren, *Proc. Boston Soc. N. H.* ii. p. 175, 1850; Wyman, *Proc. Boston Soc. N. H.* 1844, p. 110.

Prof. Lichtenstein divides this into two subgenera—"planta pilosa" for *M. mesomelas*, and "planta subnuda" for *M. chinga* and the other species. I find the extent of the baldness of the sole varies in the different specimens of the same variety, both in the young and old specimens. The form and number of the pads are always alike, only becoming more marked in the older examples.

\* Tail as long as body.

#### 1. *Mephitis varians*.

B.M.

Black, with two white streaks, converging and united on the crown; tail elongate, bushy; hair flaccid, black, generally white at the base, or all white.

*Mephitis varians*, Gray, *Mag. N. H.* 1837; *P. Z. S.* 1865, p. 148;

*Baird*, *Mamm. N. A.* p. 193; *Mexico*, pp. 19, 192 (skull).

*Mephitis macroura*, Aud. & Bachm. *N. A. Quad.* ii. t. p. 102 (not *Licht.*).

Var. *a. mesomelas*. Crown white; streak broad, continued from the crown to the end of the tail; face with a narrow white streak.

*Mephitis mesomelas*, *Licht. Darstell. d. Säugeth.* t. 45. f. 2; *Abh. Akad. Berl.* 1836, p. 277.

*Mephitis occidentalis*, *Baird, Mamm. N. A.* p. 194.

Moufette de l'Amérique Septentrionale, *F. Cuv. Mamm. Lith.*

Var. *b. mephitica*. Like *a*, but no white streak on the face; back-streaks narrowed and almost interrupted on the loins. B.M.

*Mephitis mephitica*, *Baird, Mamm. N. A.* p. 195.

Var. *c. varians*. Like *a*, with face-streak; but back-streak not reaching beyond (and some specimens not even to) the middle of the back, the white on the crown varying in size at the same time. B.M.

*Mephitis varians*, *Gray, Mag. N. H.* 1837, t.; *Baird, Mamm. N. A.* p. 193; *Mexico*, p. 192, t. 60. f. 2 (skull).

Var. *d*. Like *c*; but no white face-streak; the spot on the crown with a pair of short streaks behind, not reaching to the shoulders. B.M.

Var. *e. chinga*. Face-streak broad; crown-spot and dorsal streaks very broad, occupying nearly the whole upper surface of the body, a short black dorsal streak from the base of the tail to or towards the shoulders.

*Mephitis chinga*, *Tiedemann, Zool.* i. p. 361; *Licht. Darstell. d. Säugeth.* t. 45. f. 1; *Pr. Max. Arch. f. Naturg.* 1861, p. 218.

*Mephitis mephitica*, *Baird, Mamm. N. A.* i. p. 195.

*Mephitis chinche*, *Fischer.*

*Mustela chinga*, *Blainv. Ostéogr. Mustela*, t. 13 (teeth), t. 1 (skeleton), t. 6 (skull).

*Viverra mephitis*, *Griffith.*

*Chincha americana*, *Lesson.*

*Mephitis americana*, *De Kay, Zool. N. Y.* t. 12. f. 1.

*Mephitis americana*, var. *hudsonica*, *Richardson, Faun. Bor.-Amer.* i. p. 55.

*Chinche*, *Buffon, H. N.* xiii. p. 300, t. 39; *Pennant, Arct. Zool. Mamm.* p. 40; *F. Cuv. & Geoff. Mamm. Lith.* t.

Skunk, *Kalm.*

Wegak, or Skunk, *Hearne.*

Enfant du Diable, *Charlevoix.*

*Hab.* North America.

	Mephitis variens, c.		Mephitis variens, d.	
	in.	lin.	in.	lin.
Length of skull .....	3	0	2	9
— nose .....	0	10½	0	10
— zygoma and orbit .....	1	3½	1	2
— palate .....	1	1½	1	0½
— lower jaw .....	2	1	1	9½
Width of brain-case over ears .....	—	—	1	3½
— nose in front of orbit .....	0	11	0	10½
— tooth-line of canine and grinders .....	0	11	0	10



Speaking of the Skunk, Dr. Baird observes, "The species varies considerably in marking, though individuals from the same locality are usually quite similar." He also states, in his specific characters, "The dorsal stripe sometimes broader, sometimes wanting, as also the nuchal patch." Dr. S. Baird has kept the *M. mesomelas* distinct because Lichtenstein describes the sole of that species as hairy; but some specimens of *M. varians* are so in the young state.

## 2. *Mephitis vittata*.

B.M.

Black; sides with a white streak from each shoulder; tail elongate; base of tail bushy; hairs flaccid, the greater part of them white at the base.

*Mephitis vittata*, Gray, *P. Z. S.* 1865, p. 149.

Var. *a. vittata*. Face with a narrow white frontal streak; streaks on sides very broad, arched in front over the shoulder. B.M.

*Mephitis vittata*, Licht. *Säugeth.* t. 47 (var. ?); *Abh. Akad. Berl.* 1838, p. 278; Baird, *Mamm. N. A.* p. 200.

Var. *b. intermedia*. Face-streak none; streaks on sides moderate, straight, of same width. B.M.

Var. *c. concolor*. Face with a very narrow indistinct streak; fur all black; streaks on sides none, or reduced to a small white spot on the hinder part of one side, not seen on the other; hair on underside of tail white at the base. B.M.

*Mephitis concolor*, Verreaux, *MS.* ?

B.M.

*Hab.* Mexico (*M. Salle*).

Lichtenstein's figures above quoted (t. 47) represent a variety of this species I have not seen, with spots on the withers, and the tail very long.

\*\* Tail longer than the body.

## 3. *Mephitis mexicana*.

B.M.

Fur very soft, silky; tail elongate, hair flaccid, long, and pendent, black; a narrow streak on the nose, a broad vertebral streak from crown to tail, and a narrow streak on each side of the back.

Var. *a.* With a small white spot on each shoulder.

*Mephitis mexicana*, Gray, *Mag. Nat. Hist.* i. p. 581, 1837: *P. Z. S.* 1865, p. 149.

*Mephitis macroura*, Licht. *Abh. Akad. Berl.* 1838, t. 77; *Darstell.* t. 46, f. 1, 2.

*Hab.* Mexico.

## 8. SPILOGALE.

Head conical. Nose short, underside with a distinct central groove; muzzle small, bald, rather notched in front; nostrils lateral. Tail short, cylindrical, bushy, not so long as the body, ending in a long pencil of hair. Hind feet moderate; sole bald, flat, the front portion divided into four oblong pads, the central one small and



triangular, before the others, hinder part narrow; front claws elongate, brown. False grinders  $\frac{2}{3}$ ; upper tubercular grinder square, moderate-sized (Lichtenstein, *Abh. Akad. Berl.* 1836, t. 1. f. 2, skull).

*Mephitis*, § 2, *Gray, Mag. N. H.* i. 1837.

*Spilogale*, *Gray, P. Z. S.* 1865, p. 150.

***Spilogale interrupta.* (Little Striped Skunk.) B.M.**

Black; a spot on forehead, a spot on each temple, four streaks on back of neck and withers, a streak on side of body, that is bent up to the middle of the back behind, an interrupted band across rump, a spot on each buttock, and the base and tip of tail white.

*Mephitis interrupta*, *Rafinesque, An. of Nat.* iii. No. 4, 1818; *Licht. Abh. Akad. Berl.* 1836, p. 281, t. 2. f. 1 (tail not good).

*Mephitis bicolor*, *Gray, Ann. N. H.* i. p. 583, 1837 (*B. M.*); *Baird, Mamm. N. A.* p. 197, t. 19 (Mexico).

*Var.* Tail-end black.

*Mephitis zorilla*, *Licht. Abh. Akad. Berl.* 1836, p. 281, t. 2. f. 2 (not *Darstell.*).

*Le Zorille*, *Buffon, H. N.* xiii. p. 302, t. 41.

*Hab.* North America, California (*Douglas*).

Prof. Lichtenstein has described two species—one with an oval nose-spot and white tail, the other with a small triangular frontal spot and black tail. I have only seen three specimens: one had a black, the other a white, and the last a black-and-white tail. They each had a different-sized and -shaped nose-spot.

Prof. Lichtenstein has determined that the *Zorille* of Buffon is the American animal. It had been previously regarded as the Meer-Cat of South Africa. It is figured by Buffon as from America; but his figure does not accurately represent either species.

B. Subdigitigrade. *Hind feet rather narrow; soles hairy, with a narrow, elongate, triangular bald space behind the palm-pads; toes unequal; claws elongate, slender; tubercular grinders band-like, transverse.*—*Gray, l. c.* p. 150.

**Tribe IV. ZORILLINA.**

Flesh-tooth elongate, with a small anterior inner lobe with a single tubercle.

*Zorillina*, *Gray, P. Z. S.* 1865, p. 150.

**9. ZORILLA.**

Head conical. Nose acute, hairy, with a central groove below. Muzzle small, bald, notched in front; nostrils lateral. Ears rounded, covered with hair. Fore feet strong; toes unequal, three middle longest; claws elongate, compressed, acute. Hind foot digitigrade; sole flat and bald in front, with four unequal, large, convex pads, the hinder part compressed and covered with hair; toes unequal, the two

middle longest and unequal; claws acute, short. Tail elongate, covered with long flaccid hair. Teeth 34; false grinders  $\frac{3}{3} \cdot \frac{3}{3}$ ; upper tubercular grinder short, oblong, transverse (Licht. Abh. Akad. Berl. 1836, t. 1. f. 3, skull).

*Zorilla*, Gray, *List. Mamm. B. M.* xx. p. 67; *P. Z. S.* 1865, p. 150.

*Ictonyx*, Kaup; Sundevall, *Kong. Vet. Akad. Hand.* 1841, p. 214 (1842).

*Rhabdogale*, Wagner.

### 1. *Zorilla striata*. (The Zorille.)

B.M.

Black; spot on forehead, and each temple, and four stripes on the back (which are diluted on the sides, only leaving a broad black patch on middle of the back, and then curving to the base of the tail) white; tail black-and-white varied.

*Viverra zorilla*, *Thunb. Act. Petrop.* iii. p. 306.

*Mustela zorilla*, *Cuv. Tabl. Elém.* p. 116 (1798).

*Viverra striata*, *Shaw.*

*Mustela zorilla*, *Cuvier, R. A.; Blainv. Ostéogr. Mustela*, t. 13. f. (teeth).

*Zorilla capensis*, *Waterh. Cat. Zool. Soc.*

*Putorius zorilla*, *A. Smith.*

*Mephitis africana*, *Licht.*

*Mephitis zorilla*, *Licht. Darstell. d. Säugeth.* t. 48. f. (not *Abhand.*).

*Zorilla leucomelas*, *F. Cuv.*

*Rhabdogale mustelina*, *Wagner, Schreb. Suppl.* ii. p. 219, t. 133 a.

*Ictonyx capensis*, *Sundev. K. Vet. Akad. Hand.* 1841, p. 214.

?*Mephitis libyca*, *Ehrenb.*

*Zorilla striata*, *Gray, List Mamm. B. M.* p. 67; *P. Z. S.* 1865, p. 151.

*Mustela libyca*, *Blainv. Ostéogr. Mustela*, t. 13. f. (teeth).

Putois du Cap, ou Zorille, *Buffon, H. N.* xii.

Muis-hond, *Cape Colonists.*

*Hab.* South Africa.

Var. *senegalensis*. White streaks broader, leaving only very narrow dark dorsal ones; tail whiter.

B.M.

*Hab.* Senegal.

### 2. *Zorilla frenata*.

B.M.

Brown; fur elongate, very soft, fluffy; lips, chin, a broad band encircling the face, two broad bands diverging from the crown and two narrower diverging from shoulders, and some spots on the hinder part of the back white; tail white-and-black varied.

*Mephitis (Ictonyx) frenata*, *Sundevall, Kong. Vet. Akad. Hand.* 1841, t. 4. f. 1.

*Mephitis africana*, var., *Licht.*

*Mustela zorilla*, var., *Rüppell.*

?*Rhabdogale multivittata*, *Wagner, Schreb. Säugeth. Supp.*

*Zorilla frenata*, *Gray, P. Z. S.* 1865, p. 151.

*Hab.* Sennaar.

See also *Zorilla Vaillantii*, Loche (*Rev. Zool.* p. 497), from Algeria, which I have not seen.



## Tribe V. HELICTIDINA.

Flesh-tooth trigonal, with a broad internal lobe with two conical tubercles. Tail cylindrical.

Helictidina, *Gray, P. Z. S.* 1865, p. 152.

## 10. HELICTIS.

Head tapering; nose acute, conical; muzzle bald, obliquely truncated; underside hairy, with a central groove; nostrils inferior; ears ovate. Body slender; legs short; toes 5.5; front claws elongate, curved; hinder short and acute; sole of hind foot hairy behind, bald in front, and rhombic, for half the length of the foot, with three large oblong pads on the front and three small ones on the hinder edge; toes elongate; thumb short, far back, like *Herpestes*. Tail moderate, subcylindrical. Teeth 38; premolars  $4 \cdot 4$ ; grinders  $5 \frac{2}{3}$  (see Hodgson, *J. A. S. B. t.* 31. f. 6).

*Helictis*, *Gray, Proc. Zool. Soc.* ii. p. 94, 1833; 1865, p. 152.

*Melogale*, *I. Geoff.*; *Guérin, Mag. Zool.* v. p. 1, t. 16, 1835.

*Rhinogale*, *Gloger*, 1842.

*Mydaus*, sp., *Temm. & Müller*.

*Galictis*, *Wiegmann*.

The external appearance of the species of this genus is very similar; and there appears to be an indication of the differences in colour passing into one another.

The skulls are very distinct. 1. The skull short and ventricose; nose short, thick; the hinder part of the palate flat, with a broad opening, as wide as long on the sides, the front edge arched. *H. orientalis*. 2. Skull elongate; the nose produced, attenuated; the hinder part of the palate concave, and contracted behind the aperture; longer than wide; the front edge arched. *H. moschata* and *H. nipalensis*.

The teeth and size of the aperture in front of the orbits also differ thus in the different species:—1. The flesh-tooth large, with three lobes on the outer edge, the front one small, with two acute tubercles on the broad inner lobes; the aperture in front of the orbits moderate. *H. orientalis* and *H. nipalensis*. 2. The flesh-tooth small, shaped like those of the other species, but rather more slender; the aperture under the front of the orbits very large. *H. moschata*.

\* *Flesh-tooth large; aperture in front of orbits moderate.*  
*Melogale*.

*Melogale*, *Gray, P. Z. S.* 1865, p. 152.

1. *Helictis orientalis*. (Nyentek.)

B.M.

Brown, paler beneath; cheeks, upper lip, chin, throat, sides of neck, chest, three spots across forehead, and a narrow streak from



nape to middle of the back yellowish white; end of tail grey; feet brown.

*Gulo orientalis*, *Horsf. Java*, t.

*Mydaus macrurus*, *Kuhl, Temm. Monogr.* pl. 20.

*Mydaus orientalis*, *S. Müller*.

*Melogale fusca*, *I. Geoff. Guér. Mag. Zool.* 1835, t. 16.

*Helictis orientalis*, *Gray, List Mamm. B. M.* p. 195; *P. Z. S.* 1865, p. 152.

*Hab.* Java (*Horsfield*, called "Nyentek").

## 2. *Helictis nipalensis*. (The Oker.) B.M.

Grey-brown; forehead and nape darker; cheek, band between orbits, chin, throat, sides of neck, chest beneath, and a streak from nape to loins white; end of tail greyish. Teeth large.

*Gulo nipalensis*, *Hodgson, J. A. S. B.* 1836, p. 237.

*Helictis nepaulensis*, *Gray, Proc. Zool. Soc.* 1853, p. 191.

*Helictis nipalensis*, *Gerrard, Cat. Bones B. M.* p. 98; *Gray, P. Z. S.* 1865, p. 153.

*Hab.* Nipal (*Hodgson*); Tibet.

\*\* *Flesh-tooth small; aperture in front of orbits very large.* *Helictis.*

## 3. *Helictis moschata*. B.M.

Brown; spot on crown, temples, broad band across forehead, a small spot on cheek and on side of nose, the chin, throat, chest, and beneath white. Teeth small; upper tubercular grinder transverse, narrow, oblong.

*Helictis moschata*, *Gray, P. Z. S.* ii. p. 94; 1865, p. 153.

*Melogale personata*, *I. Geoff. Voy. de Bélanger*, t. 5.

*Mustela personata*, *Blainv. Ostéogr. Mustela*, t. 13, f.

*Hab.* China (*John Reeve*); Pegu (*I. Geoff.*).

## 4. *Helictis subaurantiaca*. B.M.

Brown; face white-varied; with a white streak from the crown to the middle of the back. Upper tubercular grinder transverse, broadly oblong in shape.

*Helictis subaurantiaca*, *Swinhoe, Proc. Zool. Soc.* 1862, p. 355, pl. 44; *Gray, P. Z. S.* 1865, p. 153.

*Hab.* Formosa.

This species is nearly identical in external appearance and colouring with the *H. orientalis*; but it has the small tooth, elongate nose, the large suborbital aperture, and narrow hinder opening to the palate of *H. moschata*. It differs from *H. moschata* in its teeth—the flesh-tooth and the tubercular tooth being relatively rather larger—and especially in the tubercular tooth being longer and more massive, being a broad oblong instead of a narrow one.

	Helictis orientalis.	H. nipalensis.	H. moschata.	H. sub- aurantiaca.
Length of skull (rather imperfect) .....	in. 1. 22 10	in. 1. 3 0	in. 1. 3 1 $\frac{1}{2}$	in. 1. 2 11
— nose .....	0 10	1 0	1 0 $\frac{1}{2}$	1 0
— zygoma and orbits .....	1 5	1 3	1 2 $\frac{1}{2}$	1 3
— palate .....	1 4	1 5 $\frac{1}{2}$	1 5 $\frac{1}{2}$	1 5 $\frac{1}{2}$
Width of brain-case over ears .....	1 2 $\frac{1}{2}$	1 3	1 3	1 3
— nose at front of orbit .....	0 8	0 8 $\frac{1}{2}$	0 8 $\frac{1}{2}$	0 7 $\frac{1}{2}$
Length of tooth-line of canine and grinders ...	0 9 $\frac{1}{2}$	1 0	1 1	0 11
— lower jaw .....	1 9	1 10 $\frac{1}{2}$	2 0	1 10 $\frac{1}{2}$

## Fam. 8. HERPESTIDÆ.

Tubercular grinders two on each side in the upper, and one in the under jaw. Nose flat and bald, beneath with a central longitudinal groove. The hind feet slender; underside bald, or more or less covered with scattered hairs. The toes slender, free, compressed, straight, slightly hairy; the claws exerted, exposed, blunt at the end. The body elongate; legs generally short. The fur is generally harsh, grizzled. The back is not crested. The tail conical or cylindrical, hairy, not dark-ringed. The anal pouches shallow, or not present. The orbit of the skull complete, or only slightly imperfect on the hinder edge.

Viverridæ (Cynopoda, or Dog-footed Viverridæ), Gray, *P. Z. S.* 1864, p. 546.

Herpesteacea, Gray, *P. Z. S.* 1864, p. 547.

*Synopsis of the Genera.*

Tribe 1. **Herpestina.** Head elongate, conical; tail conical or cylindrical.

\* *Front claws elongate, compressed; back streaked.*

1. GALIDICTIS. Toes 5.5. Tail subcylindrical, covered with long hair. Back striped.

\*\* *The front claws short, compressed; back grizzled; flesh-tooth long, narrow.*

2. HERPESTES. Toes 5.5. Tail conical, with long hair. Teeth moderate.
3. ATHYLAX. Toes 5.5. Tail conical, with long hair. Teeth very large.
4. CALOGALE. Toes 5.5. Tail cylindrical, elongate, covered with shortish hairs; tip pencilled.

5. GALERELLA. Toes 5.4. Tail cylindrical, elongate, covered with short hair.

\*\*\* *The front claws short, compressed; flesh-tooth broad, triangular.*

6. CALICTIS. Toes 5.5. Tail conical, with long hairs. Back grizzled. Pupil oblong, transverse.
7. ARIELLA. Toes 5.5. Tail elongate, subcylindrical. Back cross-banded.
8. ICHNEUMIA. Toes 5.5. Legs rather high. Tail conical, bushy. Back grizzled.
9. BDEOGALE. Toes 5.4. Legs moderate. Tail conical, bushy. Back grizzled. Soles hairy?

\*\*\*\* *Front claws elongate, produced; tail conical, with long hair; back grizzled. Lutronectes.*

10. URVA. Toes 5.5. Head elongate. Soles of hind feet hairy. False grinders  $\frac{3}{4}$ .
11. TÆNIOGALE. Toes 5.5. Head elongate. Soles of hind feet bald. False grinders  $\frac{3}{4}$ .
12. ONYCHOGALE. Toes 5.5. Head elongate. Soles of hind feet hairy; front claws very long. False grinders  $\frac{3}{4}$ .
13. HELOGALE. Toes 5.5. Nose short. False grinders  $\frac{2}{3}$ . Body slender. Soles bald.

Tribe 2. *Cynictidina*. Head short, ventricose; tail bushy, expanded laterally; claws elongate.

14. CYNICTIS. Toes 5.4.

## Tribe I. HERPESTINA.

Head elongate, conical; tail conical or cylindrical; back streaked; claws elongate, compressed.

### 1. GALIDICTIS.

Nose flat, and with a groove below; ears moderate; tail bushy; whiskers slender. Toes 5/5; front claws elongate, compressed, much arched; thumb low down, with a long claw; hinder toes:—third and fourth longest, subequal; great toes low down; claws all moderate, compressed. Soles broad, bald the whole width to the heel. False grinders  $\frac{3}{4}$ . Tail subcylindrical, curved, with long hairs. Back streaked.

*Galidictis*, I. Geoff. *Compt. Rend.* 1837, p. 580; *Mag. Zool.* 1839, t. 18; Gray, *P. Z. S.* 1848, p. 21 (not *Hodgson*); *P. Z. S.* 1864, p. 547.  
*Galictis*, I. Geoff. *Compt. Rend.* 1837, p. 581.



1. *Galidictis vittata*.

B.M.

Grey, black-and-white grizzled; back and sides with eight nearly equal, parallel, narrow, black-brown streaks; chin and beneath pale brown; hind feet and outer sides of fore legs reddish brown; tail subcylindrical, bushy, black-and-grey grizzled, white towards the end; hairs elongate, brownish white, with two, rarely three, broad black rings.

*Galidictis vittata*, Gray, *P. Z. S.* 1848, p. 21, pl. 1; in *Zool. Sulphur*, t. 1; *P. Z. S.* 1864, p. 547; *Coquerel, Mag. de Zool.* xi. p. 465, t. 18. f. 2 (skull).

*Hab.* Madagascar (*T. Thompson*, *Mus. Brit.*).

The skull described in the *Proc. Zool. Soc.* 1848 is not quite adult; it has a small adult false molar.

2. *Galidictis striata*.

Pale brown; seven or nine longitudinal black streaks, the middle one on each side behind short; head and limbs pale brown; tail whitish.

*Galidictis striata*, *I. Geoff. Mag. de Zool.* 1839, t. 18, 19; Gray, *P. Z. S.* 1864, p. 547.

*Galictis striata*, *I. Geoff. Compt. Rend. Acad. Sci.* 1837, p. 581.

*Mustela striata*, *Geoff. Mus. Paris.*; *Fischer, Syn. Mamm.* p. 224.

*Pictorius striatus*, *Cuvier, Règne An.* ed. 2, p. 144.

*La Belette grise de Madagascar*, *Sganzin, Rev. et Mag. Zool.* 1855, p. 41.

*Hab.* Madagascar.

In the figure the brain-cavity is nearly three-fifths the entire length of the skull, and the skull at the widest part of the zygomatic arch is as large as the brain-cavity. Skull oblong, rather elongate; brain-cavity rather more than half the entire length; orbit very incomplete behind; forehead arched; crown flat; upper false grinders two, compressed; the flesh-tooth elongate, trigonal, much longer than broad at the front edge—the internal tubercle moderate, on the front edge; tubercular grinders transverse, the first rather trigonal, narrow on the inner side, the second oblong, much smaller (see *I. Geoff. l. c.* t. 19).

## 2. HERPESTES.

Body elongate; limbs moderate; back grizzled. Tail conical, covered with long hairs. Toes 5.5; claws short, compressed. Pupil linear, erect. Skull elongate. Teeth 40; false grinders  $3\frac{1}{2}$ .  $3\frac{1}{2}$ ; flesh-tooth elongate, narrow, longer than broad on the front edge; tubercular grinders transverse.

*Herpestes*, *Illiger*; Gray, *P. Z. S.* 1864, p. 548.

*Mangusta*, *Olivier*.

*Ichneumon*, *Geoff.*

- \* *Animal large: hair of body and tail long, harsh; tail ending in a black pencil.*

### 1. *Herpestes ichneumon*.

B.M.

Grey, hairs largely ringed; head and middle of the back darker; legs reddish; feet and end of tail black, with a long flaccid pencil; under-fur short, reddish.

*Herpestes ichneumon*, Gray, *Cat. Mamm. B. M.* p. 51; *P. Z. S.* 1864, p. 548.

*Viverra ichneumon*, Linn. *S. N.*

*Herpestes Pharaonis*, A. Smith, *S. A. Quart. Journ.* i. p. 49; Schinz, *Syn. Mamm.* i. p. 367.

*Ichneumon Pharaonis*, Geoff. *Mém. Egypt.*

*Mangusta ichneumon*, Fischer, *Syn.* p. 163.

*Ichneumon Ægypti*, Tiedem. *Zool.* i. p. 364.

*Mangouste d'Égypte*, F. Cuv. *Mamm. Lith.* t.

*Mangouste d'Alger*, F. Cuv. *Mamm. Lith.* t.

*Hab.* North Africa; Egypt; Senegal (*Reade*, B.M.); Cape Filpila, 1850.

The skull is elongate, rather slender; the brain-case (that is, from the occiput to the back edge of the orbit) is three-fifths of the entire length; the crown is straight; the forehead arched and rather convex; the orbits are not quite complete behind. The teeth are normal, moderate-sized; the flesh-grinders of the upper jaw rather narrow, the front being two-thirds the length of the outer edge; the front tubercular trigonal, transverse; the hinder one small and oblong, transverse. Length  $3\frac{5}{12}$  inches, width at zygomatic arch 2 inches—the same as the length of the brain-case; width of brain-case  $1\frac{5}{8}$  inch. The skull is contracted in front, just over the back edge of the orbits. Lower jaw very shelving in front; false grinders  $\frac{4}{1}$ ; tubercular grinder oblong, elongate, moderate, with a very obscure anterior lobe, two lateral, and one larger hinder lobe.

### 2. *Herpestes caffer*.

B.M.

Like the preceding, but darker; under-fur shorter, red; end of tail with a long, black, flaccid pencil.

*Herpestes caffer*, Licht. *Verz. der Säugeth.* 1835; Gray, *P. Z. S.* 1864, p. 549.

*Viverra caffra*, Gmelin, *S. N.*

*Ichneumon Pharaonis*, Verreaux.

*Hab.* South Africa, on plains away from the sea; Natal (*Kraus*).

The skull of *H. caffer* is elongate, larger and longer than that of the adult *H. ichneumon*, and is more convex on the forehead and behind the orbit. The front of the brain-case is contracted some distance behind the back edge of the orbit, while in *H. ichneumon* this contraction is just over that part. The zygomatic arch is very long, much longer than in *H. ichneumon*, and not so arched out as it is in the latter species. Like as the two species are externally, they are very distinct in the form of their skulls. The teeth of the



two species are very similar; but the teeth of *H. caffer* are considerably longer, stronger, and rather wider proportionately, especially the tubercular teeth. Length of skull 4 inches; width at zygomatic arch  $2\frac{1}{8}$  inches, of middle of brain-case  $1\frac{5}{8}$  inch. Lower jaw very shelving in front, with a prominence on the lower edge under the end of the tooth-line; false grinders  $\frac{1}{4}$ ; tubercular moderate, oblong, with two anterior lateral and one larger posterior prominence.

The great difference between the skulls of these two species, which are so like externally, should act as a caution to naturalists, who complain so frequently that species are often separated on too slight external characters. Temminck, for example, would unite *H. ichneumon*, *H. caffer*, and *H. Widdringtonii* as one species, and at most only as "permanent local varieties," whatever those may be.

### 3. *Herpestes dorsalis*.

"Back with a narrow, moderately distinct, golden-yellow stripe from nose to tip of tail, and another on each side of the face, which diverges from the front, passes over the eyes, and terminates on the side of the head.

*Ichneumon pharaonis*, var., *A. Smith, S. A. Q. J.* p. 49.

"*Hab.* South Africa.

"Length—head and body 18 inches; tail 15 inches (not adult)."

### 4. *Herpestes Widdringtonii*.

B.M.

Like *H. pharaonis*; but fur shorter, under-fur more abundant and longer, giving the animal a reddish tint; tail pencilled, distinct, but shorter.

*Herpestes Widdringtonii*, *Gray, Ann. Nat. Hist.* ix. p. 49, 1842; *P. Z. S.* 1864, p. 549.

*Hab.* South of Europe; Sierra Morena (*Widdrington*).

### 5. *Herpestes numidianus*.

B.M.

Like *H. ichneumon*, but blacker; the rings of the hairs very distinct; throat, legs, and feet black.

*Herpestes numidianus*, *F. Cuvier, Mamm. Lith.* t.; *Verreaux, MS.*; *Gray, P. Z. S.* 1864, p. 550.

*Hab.* Numidia (*Verreaux*).

### 6. *Herpestes madagascariensis*.

"Hair of the head, throat, breast, belly, and lower part of the extremities short, that of the other parts longer. The colour of the upper and lateral parts of head and of lower parts of extremities brown-red, freely speckled with black and white; the upper and lateral parts of the neck, body, and the whole of the tail speckled, being black, brown-red, and pale reddish white, each hair annulated with these three colours, which are darkest upon the back; throat



and lower part of the neck pale tawny; breast, belly, and inner side of extremities dirty pale rufous, speckled with white; woolly hair yellowish white; tail rather thick towards the root, very slender at the point; outer surface of ears thickly covered with short brownish-yellow hairs, inner surface more thickly with a dull tawny sort; whiskers black; nails dark horn-colour. Length of body and head  $15\frac{1}{2}$  inches, of tail 14 inches."

*Ichneumon madagascariensis*, *A. Smith, S. African Quart. Journ.* p. 56; *Gray, P. Z. S.* 1864, p. 550.

"*Hab.* Madagascar (*A. Smith*).

"Size and form of *H. caffer*, but colours much lighter; and when placed side by side, various other differences are evident."

#### 7. ? *Herpestes Bennetti*.

Red-brown, slightly grizzled with whitish; tail rather depressed, underside pale red, tip black-pencilled.

*Herpestes Bennetti*, *Gray, Loudon's Mag. N. H.* i. p. 578; *P. Z. S.* 1864, p. 550.

*Hab.* Madagascar (*Mus. Zool. Soc.*). Specimen not to be found.

#### 8. *Herpestes Jerdonii*.

B.M.

Grey, closely and broadly white-ringed; the head darker; the feet darker brown, only slightly annulated; tail conical, with a black pencil of elongated, flaccid, black hairs.

*Herpestes Jerdonii*, *Gray, P. Z. S.* 1864, p. 550.

*Hab.* Asia: Madras (*Jerdon*, 1846).

Very like *H. ichneumon*, but rather paler.

Length of head and body 19 inches, of tail 17.

Skull (aged) elongated; orbit complete. The false grinders  $\frac{3}{4}$ ; the front very small; the second and third triangular, with an internal lobe. The flesh-tooth narrow, elongate; outer edge much longer than the width of the front margin; internal lobe small, slender, on the front edge. Tubercular transverse; first triangular, very short and broad, outer edge oblique, inner part very narrow, acute; second very small, oblong. The hinder part of the palate contracted, with a small wing on each side on the upper, and with an acute keel on each side of the lower edge, ending in a long process behind, with a nodus on the outer side near the end; internal opening narrow, transverse. Lower jaw rather strong; chin shelving, lower edge straight, angle produced, lobe keeled on the inner upper margin. Length of skull about 2" 3" (imperfect), of nose 11"; width of back of mouth 1" 1".

See 1. *Ichneumon Edwardsii*, Geoff. Egypt, p. 138, from Edw. Birds &c. p. 199, t. 199.

2. *Ichneumon major*, Geoff. l. c. p. 139, from *Grande mangouste*, Buff. Supp. iii. p. 173, t. 28. These species are only known from the figures cited.

\*\* *Smaller animal: hair shorter; tail with a small black or red tip.*

### 9. *Herpestes apiculatus*.

B.M.

Fur harsh, dark grey, grizzled with broad black-and-white rings; hair rather elongate, with black tip and a broad white subterminal band; tail with a very slight black tip, from the dark end of the terminal hairs.

Length 14 inches; tail 11 inches (B.M.).

*Herpestes apiculatus*, Gray, *Cat. Mamm. B. M.* p. 51; *P. Z. S.* 1864, p. 551.

*Herpestes pulverulentus*, Wagner, *Supp. Schreb. Säugeth.* t. 116. f. 2.

*Herpestes caffer*, Verreaux, *MS.*

*Hab.* South Africa, Cape of Good Hope, on rocks near the sea (*A. Smith*).

\*\*\* *Smaller animal: hair of body shorter; tail coloured like the back.*

† *African.*

### 10. *Herpestes punctatissimus*.

Fur short; the hairs at the base of the tail twice as long as those of the body; the upper part of the body and limbs pale yellow, dotted with very fine blackish-brown rings, covering all the parts except the chin; the middle part of the neck and belly dirty white; the hairs of the tail, to the extreme point, have many rings; the tip of the tail pale reddish.

Length of head and body  $10\frac{1}{2}$  inches, tail 9 inches.

*Herpestes punctatissimus*, Temm. *Esq. Zool.* p. 108; Gray, *P. Z. S.* 1864, p. 551.

*Hab.* Central and Eastern Africa (*Temm.*, *Mus. Leyden*).

Teeth very strong, much larger than in other skulls of the same size.

### 11. *Herpestes loempo*.

B.M.

Under-fur pale ochraceous; longer hairs black-tipped; fur of head, neck, and back yellow-dotted; back and nape blacker; tail variegated at the base and tufted with long black hairs which are yellowish at the base; legs deep black.

*Herpestes loempo*, Temm. *Esq. Zool.* p. 93, 1853; Gray, *P. Z. S.* 1864, p. 551.

*Herpestes mutzigella*, Verreaux, *MS.* (not Rüppell).

Arompo, Bosman, *Guinea*, p. 33, f. 8.

In the specimen not in complete fur the ochraceous undercoat is seen through the longer hairs.

*Hab.* Guinea, near the graves. (Called "Loempo" by a negro at Guinea.)

The skull is long, ventricose; face and forehead flat, shelving gradually to the back of the orbits, and then shelving in a straight line towards the hinder part of the head. The cavities for the temporal muscles are very large, and they extend in front, and meet



together on the forehead at a line rather in front of the hinder edge of the orbit. The orbits are large, the hinder edge entire; the hinder part of the skull is broad; the hinder part of the palate between the temporal muscles is narrow and elongate, the hinder opening being nearer the hinder than the front edge of the temporal fossæ. The hinder grinders are slender; the crown of the flesh-tooth is triangular, the front side being the shortest, with the inner tubercle on the straight front edge.

## 12. *Herpestes Pluto*.

B.M.

Black; sides of the head, neck, and front of the body pale brownish, with broad white subterminal bands on the ends of the hairs; hairs harsh; tail black, grey at the base, hairs not ringed at the end; front of thighs, legs, and feet black.

*Herpestes Pluto*, *Temm. Esq. Zool.* p. 93, 1853; *Gray, P. Z. S.* 1864, p. 552.

*Hab.* Guinea (*Temminck*); West Coast of Africa (*Gerrard*), adult; ? East Africa (*Verreaux*).

The adult specimens from Gerrard and Verreaux are rather paler than the younger one from Leyden; length of head and body 20 inches, tail 14 inches. Younger from Guinea, length of body and head 16 inches, tail 11 inches. They have also a slight indication of a crest of longer black hairs on the back of the neck.

Skull short, broad; nose shelving; forehead convex; crown flat; orbits complete. False grinders  $\frac{3}{4}$ ; first conical, blunt; the second compressed; the third trigonal, with a distinct internal and hinder tubercle. Flesh-tooth rather longer than wide on the front edge; the inner tubercle on front edge, broad, rounded. Tubercular grinders transverse; the front about twice as wide as long, rounded on the inner edge; the second smaller, rather oblong, with two well-marked tubercles, rather narrower and more acute on the hinder part of the inner edge.

Skull—length  $3\frac{1}{2}$  inches; width at zygoma  $2\frac{1}{10}$  inches, of brain-cavity  $1\frac{1}{4}$  inch.

“Like the *H. loempo*; the head and muzzle longer; tail shorter, covered with hairs like those of the body; fur of body, limbs, and tail intense shining black; under-fur sombre or dark brown; the fur of the chin, throat, and cheeks black, with very small yellow dots; all the rest intense black. The younger are marked with very fine dots, produced by the yellow rings on the black hairs.”—*Temm.*

This does not agree with the specimen (which appears to be changing its teeth) which we received from the Leyden Museum.

## 13. *Herpestes iodoprymnus*.

“Supra ex albedo griseoque variegatus, capite, collo, maniculis atque podariis cinerascentibus, hypochondriis viridi-griseis, prymna saturate castanea, pectore, abdomine cristaque unicoloribus ex rufescente isabellinis; cauda longe disticha, basim versus villosissima.



supra et infra ad apicem nigrum usque castanea, rhinario et plantis denudatis nigris.

"Long. tota 24".

*Herpestes jodoprymnus*, *Heuglin*, *Nov. Acta Leop.* xxix. p. 23; *Gray*, *P. Z. S.* 1864, p. 553.

"*Hab.* Eastern Abyssinia."

#### 14. *Herpestes Lefebvrii*.

*Herpestes Lefebvrii*, *Des Murs et Prevost*; *Heuglin*, *Nov. Act. Leop.* xxix. p. 23; *Lefebvre*, *Voy. Mamm.* t. 1 (not described); *Gray*, *P. Z. S.* 1864, p. 553.

*Hab.* North-east Africa (*Heuglin*).

†† *Asiatic*.

#### 15. *Herpestes griseus*.

B.M.

Pale grey, largely white-ringed; head and legs darker; hairs harsh, elongate, with a very broad white subterminal ring; feet blackish; tail bushy; cheeks and throat more or less reddish.

*Herpestes griseus*, *Desm. Mamm.* p. 212; *Gray*, *P. Z. S.* 1864, p. 553.

*Ichneumon griseus*, *Geoff. Egypt.* ii. p. 157.

*Mangusta grisea*, *Fischer*, *Syn. Mamm.* p. 164.

*Herpestes pallidus*, *Schinz*, *Syn. Mamm.* i. p. 373.

*Viverra grisea*, *Thunb. Mém. Acad. Pétersb.* iii. p. 306.

*Hab.* India: Bengal (*Oldham*); Travancore (*P. Poole*); "Sumatra" (*Raffles, Waterh. Cat.*); Dukhun (*Sykes*); Nepal (*Hodgson*).

*Var.* Paler, with a reddish tinge, and the pale rings rather narrower.

*Hab.* India (*Hardwick*).

Skull and teeth normal; orbit complete; nose short, thick; false grinders 3.3, first conical, roundish, third triangular. Flesh-tooth rather longer than broad in front. Tubercular transverse; the first with the outer side sloping; the hinder small, oblong, short. Lower jaw shelving in front. Skull—length  $2\frac{3}{4}$  inches; width of brain-case  $2\frac{3}{4}$  inches, at zygomatic arch  $1\frac{5}{12}$  inch.

#### 16. *Herpestis persicus*.

B.M.

Pale ashy, very closely and abundantly black- and white-punctulated; hair short and soft, with black ends and a broad white band near the tip; the chin and underside uniform ashy; tail conical, tapering, coloured like the back; feet like the back, but with shorter hair.

*Herpestes persicus*, *Gray*, *P. Z. S.* 1864, p. 554.

*Hab.* Persia: Rhugistan and Mohammerah, date-groves (*Kennet, Loftus*, 1853).

Skull (adult) rather elongate; nose short, forehead very broad, convex; the orbits complete; lower jaw moderately strong, chin shelving. Teeth 40, normal; the third false grinder subtriangular,

with small, central, prominent lobe; the flesh-tooth elongate, sub-trigonal, the outer side considerably longer than the front one, the inner tubercle small, on the front edge; the front tubercular triangular, transverse, with a very sloping outer edge. Length of skull 2" 6"', of nose  $7\frac{1}{2}$ "'; width of under palate behind  $9\frac{1}{2}$ "', of brain-case 10"', of zygomatic arch 1" 3"'.

Somewhat like *Calogale nyula*, but much paler and more uniform in dotting; the head shorter and broader, and the tail conical, tapering, thicker at the base.

### 17. *Herpestes fuscus*.

B.M.

Black-brown, white-dotted; hair very long and harsh; ends black, with a narrow pale band very near the tip; throat and belly reddish brown; tail bushy, like the back.

*Herpestes fuscus*, *Waterhouse*, *P. Z. S.* 1838, p. 55; *Gray*, *P. Z. S.* 1864, p. 554.

*Hab.* India (*Waterhouse*); Madras (*Jerdon*, 1846).

Mr. *Waterhouse*'s type is in the B. M.: length of body and head 10 inches, tail 17 inches. The one from Madras is smaller.

The skull is intermediate in form between that of *H. ichneumon* and that of *Athylax paludosus*; the brain-case is nearly of the same external form as the latter, but not quite so ventricose; the orbit is small and rather incomplete behind; the zygomatic arch is rather convex, but, as in *H. ichneumon*, the convexity is more on the hinder end, while it is regularly bowed out in *A. paludosus*. The teeth of the upper jaw are very like those of *H. ichneumon*; but the outer edge of the front tubercular is not so oblique, and the hinder tubercular is even smaller; they are very much slenderer and less bulky than the teeth of *A. paludosus*. Lower jaw very shelving in front; lower edge arched, narrow behind; false grinders 4. 4; tubercular oblong, elongate, rather small, crown four-lobed, one lobe at each end and two in the middle portion.

The length of the skull  $3\frac{1}{2}$  inches; the width of the brain-case  $1\frac{1}{4}$  inch, of the zygomatic arch  $1\frac{1}{2}$  inch.

### 18. *Herpestes javanicus*.

B.M.

Dark black-brown, very minutely punctured with yellow; head redder; tail conical; claws short, conical.

*Herpestes javanicus*, *Desm. Mamm.* p. 212; *Gray*, *P. Z. S.* 1864, p. 554.

*Mangusta javanica*, *Horsf. Zool. Java*, t.

*Mustela galera*, *Desm.* (*fide icon. ined.*).

*Viverra mangusta*, *Temm.*

*Ichneumon javanicus*, *Geoff. Mém. Egypt.* ii. p. 157.

*Hab.* Java and Sumatra (*Horsfield*, *Müller*); Penang and Malay peninsula (*Cantor*).

*Young*.—Pale bay; some of the hair of the tail with long grey tips.

*Hab.* Sumatra (*Raffles*).



19. *Herpestes semitorquatus*.

B.M.

Dark red-brown, very slightly punctulated; cheeks and sides of the neck uniform pale bay; legs and feet black; tail black, with some white tips to the hairs. Length of body and head 18 inches, tail 11 inches.

*Herpestes semitorquatus*, Gray, *Zool. Sulphur*, t. 3. f. 1-3, 1849; *P. Z. S.* 1864, p. 555.

*Hab.* Borneo (*Belcher*).

The skull is not quite adult, much broader compared with its length than even that of *Athylax paludosus*. The contraction in the front of the brain-cavity is slight, and rather in front of the back edge of the orbits. The orbit is rather large, and slightly incomplete behind; the zygomatic arch is rather short, and not much bowed out. The teeth are normal, and very like those of *H. ichneumon*; they occupy a rather shorter space. Length of the skull  $3\frac{1}{8}$  inches; width of the brain-case  $1\frac{5}{12}$ , of the zygomatic arch  $1\frac{1}{2}$  inch. Skull short and broad.

Lower jaw—chin shelving; lower edge arched, without any prominence under the end of the tooth-line; false grinders 4.4; the front false grinder small, deciduous; the tubercular grinders oblong, longitudinal, with two unequal anterior and one large posterior tubercle.

Like *H. brachyurus* in some respects; but the tail is longer, and the sides of the neck bright pale red, separated from the other parts by a defined line.

20. *Herpestes exilis*.

"Pallide flavo nigroque annulatis; capite et dorso cinnamomeo et nigro annulatis; pedibus nigrescentibus, gula cinnamomea, ventre pallidiore; cauda pilosa, non penicillata, palmis plantisque nudis.

"Long. corp.  $10\frac{1}{2}$  poll., caudæ 8 poll."

*Herpestes exilis*, Eydoux, *Zool. de la Bonite*, t. 3. f. 7-9; Gray, *P. Z. S.* 1864, p. 555.

"*Hab.* East Indies, Touranne (*Eydoux*)."

21. *Herpestes malaccensis*.

Dull ashy, beneath rather paler; hairs black, white- and yellow-ringed; orbits, ears, and tip of nose naked, violet; tail the colour of the body, very thick at the base, ending with yellow hairs.

*Herpestes malaccensis*, F. Cuv. *M. Lithog.* t.; Gray, *P. Z. S.* 1864, p. 555.

*Mangusta malaccensis*, Fischer, *Syn.* p. 164.

*Herpestes pallidus*, var., Schinz, *Syn. Mamm.* i. p. 373.

*Herpestes Frederici*, Desm. *Dict. S. Nat.* xxix. p. 60.

*Herpestes Leschenaultii*, Schinz, Cuv. *Thierr.* t.

*Hab.* Malacca, Pondicherry (*Leschenault*).



\*\*\*\* Smaller: tail like back, much shorter than the body.

## 22. *Herpestes brachyurus*.

B.M.

Black, hairs yellow-ringed; under-fur brown; face, cheeks, and sides of neck yellower; belly and tail darker; throat pale yellow-brown; fore legs and feet blackish; tail thick, about half as long as the body. Length of head and body 18 inches, tail  $7\frac{1}{2}$  inches.

*Herpestes brachyurus*, Gray, *Mag. N. H.* i. p. 578, 1836; *Voy. of the Samarang*, *Mamm.* t. 4. f. 123, 1849; *P. Z. S.* 1864, p. 556.

*Mangusta brachyura*, De Blainv. *Ost. Atlas*, t. 6.

*Hab.* Borneo (Malacca).

The skull is most like that of *H. caffer*, but shorter; the brain-case, the zygomatic arches, and the face are shorter and more ventricose; the forehead broader and regularly convex. The constriction of the front of the brain-case is rather behind the orbit, and not very great; the orbit is rather small, and complete behind. The teeth are normal, and very like in proportion and form to those of *H. ichneumon*, but rather larger in all parts, as the skull is larger; brain-case five-eighths of entire length. Length of the skull  $3\frac{5}{8}$  inches; width of brain-case  $1\frac{2}{8}$  inch, at zygomatic arch  $2\frac{1}{12}$  inches.

## 3. *ATHYLAX*.

*Atilax*, F. Cuvier, *Mamm. Lithogr.* 1826, iii. t.

*Athylax*, I. Geoff. *Mag. Zool.* 1837; *De Blainv. Ostéogr.*; Gray, *P. Z. S.* 1864, p. 556.

*Galera*, Brown, *Hist. Jam.* i. p. 85, 1756.

Like *Herpestes*, but teeth and jaws stronger. Toes 5.5; claws blunt. Skull elongate. Teeth 40, normal, very massive, with large acute tubercles on the crown; the false grinders  $\frac{3}{4}$ . The lower jaw very strong, with a well-marked chin, and a tubercle on the lower edge under the posterior end of the tooth-line (*De Blainv. Ost. Viverra*, t. 5). The grinders much longer and broader, with larger and higher tubercles, and the hinder upper tubercular grinder much larger than in most, if not in any other, of the genera; but in the disposition and number of the tubercles they are just like those in the other species.

M. I. Geoffroy compares this genus with his *Galidia*, and concludes that they are distinct (see *Mag. de Zool.* 1839, p. 25).

This genus is separated from *Herpestes* by the large size and thickness of the teeth and the strength of the lower jaw, with its two distinct prominences. The skull and lower jaw of both species, if they are distinct, are figured by De Blainville, as above referred to.

### 1. *Athylax vansire*.

*Atilax vansire*, F. Cuvier, *Mamm. Lithog.* p. 411, t.; *Dict. Sci. Nat.* t.

*Athylax vansire*, Gray, *P. Z. S.* 1864, p. 557.

*Mustela galera*, *Erxl. Syst.* p. 453; *Schreb. Säugeth.* t. 155.

*Viverra galera*, Shaw.

- Herpestes galera*, *Desm. Mamm.* p. 212; *Wagner, Gel. Anzeig.* ix.  
*Mangusta galera*, *Fischer, Syn.* p. 165.  
*Mangouste vansire*, *Geoff.*  
*Mangusta (Athylax) galera*, *De Blainv. Ostéogr. Viverra*, t. 5 (skull).  
*Ichneumon vansire*, *A. Smith, S. A. Q. J.* p. 53.  
*Ichneumon galera*, *Geoff. Mém. Egypt.* p. 138.  
*Vansire*, *Buffon, H. N.* xiii. p. 157, t. 21.

*Hab.* Madagascar.

According to De Blainville's figure, the skull is more solid and stronger than that of *A. paludosus*. Temminck thinks this a variety or local state of *Herpestes paludosus* (*Esq. Zool.* p. 100).

The description of the *Vansire*, from a stuffed specimen, is as follows:—"The fur is less long than that of a Marten or Polecat, of the same dark brown colour on all parts of the body; the underfur is brown; the longer hairs are brown at the roots; the remainder blackish and reddish, which succeed each other at small intervals to the tip. These two colours occupy all the length of the hairs of the tail. Toes 5.5. Length of body and head 13 inches, tail 7 inches, hair  $2\frac{1}{2}$  inches long. Madagascar."—*Buffon, H. N.* xiii. p. 169, t. 21.

In the figure, the claws are represented as long, compressed, arched, acute.

The skull of the animal figured by F. Cuvier is engraved in *De Blainv. Ostéogr.* t. 5.

## 2. *Athylax paludosus*.

B.M.

Brown, closely yellow-punctulated; hair elongate.

- Herpestes paludosus*, *Cuv. R. A.*  
*Mangusta urinatrix*, *A. Smith, Zool. Journ.* iv. p. 237.  
*Herpestes palustris*, *Rippell.*  
*Herpestes griseus*, *Burchell, Cat.*  
*Herpestes caffer*, *Mus. Stuttgard.*  
*Herpestes paludinosus*, *Peters, Reise Mossamb. Säugeth.* p. 119.  
*Herpestes atilax* (partly), *Schinz, Syn. Mamm.* i. p. 371.  
*Ichneumon urinatrix*, *A. Smith, S. African Quart. Journ.* i. p. 51.  
*Mangusta paludinosus*, *De Blainv. Ostéogr. Viverra*, t. 5 (skull), t. 12 (teeth).  
*Athylax paludosus*, *Gray, P. Z. S.* 1864, p. 557.

*Hab.* South Africa, Cape of Good Hope, on the banks of the rivers, a great diver (*A. Smith*); East Africa, Quillimane (*Peters*).

*Var.* Black-brown, only very slightly punctulated, except on the side of the throat.

*Var.* Canine teeth very strong.

*Hab.* Guinea (*Gervais*).

The skull is wider, compared with its length, than in most species of the genus; the brain-case is more convex; the contraction in the front of the brain-case is not so great or so sudden as in *Herpestes ichneumon* and *H. caffer*, and is only a very small distance behind the hinder edge of the orbits. The orbit is very incomplete behind.



The teeth are normal; they are all much more bulky and broader than in any of the other species of the genus which I have seen; the hinder upper false grinder is triangular, with nearly equal sides; the flesh-tooth is very strong, the front edge being nearly four-fifths of the length on the outer side; the first tubercular is not twice as broad as the length of the outer edge. The brain-case is about five-eighths of the entire length. The hinder part of the palate contracted, flat, with a diverging crest on each side above, and a ridge on each side below, with the aperture transverse, in a line with the base of the lateral crest. The bullæ large, vesicular, rounded below and behind. Length of the skull  $3\frac{1}{2}$  inches; width of brain-case  $1\frac{1}{2}$  inch, at zygomatic arch  $2\frac{1}{8}$  inches. The zygomatic arch, in comparative length and convexity, is very like that of the skull of *H. ichneumon*. Lower jaw strong, short, with a distinct chin-angle in front; teeth very large and strong; tubercular oblong, longitudinal, large, with two anterior and one broad hinder lobe; the angle behind with flattened expanded processes.

### 3. *Athylax robustus*.

B.M.

Brown, very minutely and closely punctured; the head blacker, with a subvertical band; the edge of the lower jaw and cheeks under the ears yellowish, not punctulated; legs and feet nearly black; tail black-brown, punctulated.

*Athylax robustus*, Gray, P. Z. S. 1864, p. 558.

*Hab.* Africa: "White Nile" (no. 6168, adult; no. 6169, younger) (*Parzudaki*).

Very like *A. paludosus*, but paler, and with pale cheeks; the teeth are very large and strong, like those of the *A. paludosus* variety from Guinea.

Lower jaw like that of *A. paludosus*, but not quite so strong, and more sloping in front; the compressed teeth rather large; the tubercular oblong, elongate, moderate, with two large lobes in front, and one large behind.

Skull elongate; nose short, thick; forehead convex; orbits complete. Teeth 36; the false grinders  $\frac{2}{3}$ , with a short space between the canine and the first false molar, where a small tooth may have fallen out. The false grinders triangular, with a triangular tubercle on the middle of the inner side. The flesh-tooth massive, triangular, nearly as wide in front as long on the outer side, with a large internal tubercle in a line with the front edge. Tubercular grinders transverse; the front triangular, much wider than long, outer edge oblique, inner edge narrow; hinder one oblong, much smaller. The hinder part of the palate produced nearly to a line with the condyles, keeled on each side, and with a strong keel on each side of the lower surface, edging the very narrow contracted hinder opening. Ear-bullæ very large, vesicular, rounded below and behind. Lower jaw strong, solid, nearly as high behind as in front; chin shelving; gonyx long, the angle produced, bent up at the end,



and keeled on the outer lower edge. Length of skull  $4\frac{6}{12}$  inches, of nose  $1\frac{1}{2}$  inch; width of brain-case  $1\frac{1}{2}$  inch, of back of mouth  $1\frac{1}{2}$  inch, of zygomatic arch  $2\frac{1}{2}$  inches.

Fig. 21.

Skull of *Athylax robustus*.

## 4. CALOGALE.

Body elongate. Tail very long, slender, cylindrical, covered with short hair, with longer at the tip. Toes 5 . 5; claws short, triangular, acute. Pupil linear, erect. Skull elongate; brain-case elongate, two-thirds the length of skull (see Peters, Reise, t. 28). Teeth 40; false grinders  $\frac{2}{3}$  .  $\frac{2}{3}$ , compressed; flesh-tooth narrow, much longer

than broad, with inner tubercles on front edge; tubercular grinders  $\frac{2}{1}$ ,  $\frac{2}{1}$ , transverse, hinder very small.

*Calogale*, Gray, *P. Z. S.* 1864, p. 560.

\* Tail like back, rather thick. Pupil oblong, horizontal.

### 1. *Calogale nyula*.

B.M.

Pale grey, very closely and minutely black- and white-punctulated; tail elongate, rather tapering, coloured like the back.

*Herpestes nyula*, Hodgson, *J. A. S. Beng.* 1836, p. 236.

*Herpestes pallidus* (partly), Schinz, *Syn. Mamm.* i. p. 373.

*Herpestes nigula*, Hodgson, *Calcutta Journ. N. H.* iv. p. 287.

*Calogale nyula*, Gray, *P. Z. S.* 1864, p. 560.

*Hab.* India: Nepal, Open Tarai (Hodgson); Salt Range (Oldham).

Length of head and body 15 inches, tail 12 inches.

The largest species of the genus, but much smaller than *Herpestes griseus*, which it somewhat resembles.

Skull very like *H. griseus*, but nose longer; orbit complete, and more compressed and tapering; the flesh-tooth and the front tubercular grinder rather larger and more massive. Skull—length  $2\frac{3}{4}$  inches; width at brain-case 1 inch, at zygomatic arch  $1\frac{1}{4}$  inch.

These animals have the tail rather more bushy than the more typical *Calogale*; but they have the narrow skull and longer narrow brain-case and slender narrow flesh-tooth of the genus.

### 2. *Calogale nepalensis*.

B.M.

Dark grey, very minutely and closely punctulated, with black and pale-whitish hairs, with a broad subterminal pale band; tail subcylindrical, pencilled at the end, coloured like the back.

Length 13 inches, tail 11 inches.

*Herpestes nepalensis*, Gray, *Mag. N. H.* p. 578, 1836; Hodgson, *J. A. S. Beng.* p. 235.

*Herpestes auropunctatus*, Hodgson, *J. A. Soc. Beng.* i. p. 578.

*Herpestes javanicus*, Hodgson.

*Herpestes griseus*, Hodgson, *Journ. Asiat. Soc. Bengal.* xiv. p. 346.

*Herpestes pallipes*, Blyth, *J. Asiat. Soc. Beng.* xiv. p. 346.

*Calogale nepalensis*, Gray, *P. Z. S.* 1864, p. 560.

*Hab.* India: Nepal, hill regions (Hodgson); Assam (McClelland); Afghanistan (Griffith).

Skull—orbit complete, like *C. grisea* and *C. nyula*, but smaller; the nose short, like *C. grisea*, but more compressed; teeth normal, very like *C. nyula*, the hinder tubercular being larger than in *C. grisea*. Skull—length  $1\frac{5}{8}$  inch; width at brain-case  $\frac{4}{5}$  inch, at zygoma  $1\frac{1}{4}$  inch.

### 3. *Calogale rutila*.

B.M.

Grizzled chestnut-brown, variegated with black and white rings on the hairs; head and limbs darker chestnut, with scarcely any,

or very narrow, white rings; lips and throat and underpart of the body uniform duller brown, not grizzled; ears brown; the nape with longer hairs, forming broad short crests.

*Herpestes rutilus*, Gray, *P. Z. S.* 1861, p. 136.

*Calogale rutila*, Gray, *P. Z. S.* 1864, p. 561.

*Hab.* Cambogia (*Mouhot*, one specimen).

#### 4. *Calogale microcephala*.

Head very small; teeth very small; ears close, short; nose very short and narrow. Fur finely dotted all over, deep brown and dull yellow, of the underpart dirty white; the under-fur ashy at the base, with a very broad yellow band; the hairs silky, blackish brown, with small ochraceous rings; the hairs of the tail with broader rings, those of the tip similar. Length of head and body 10 inches, of tail  $9\frac{1}{2}$  inches.

*Herpestes microcephalus*, Temm. *Esq. Zool.* p. 113.

*Calogale microcephala*, Gray, *P. Z. S.* 1864, p. 561.

*Hab.* — ? (*Mus. Leyden*, procured at *Havre*).

\*\* Tail-end bright bay, very slender.

#### 5. *Calogale sanguinea*.

Head ashy, black-dotted; body isabella-red; hair with tip and rings brown; throat, chest, and belly white; feet pale; tail isabella and black, varied, tip bright red-brown. Length of head and body  $11\frac{1}{2}$  inches, of tail  $12\frac{1}{2}$  inches.

*Herpestes sanguineus*, Rüpp. *Fauna Abyss.* p. 27, t. 8 & 10 (skull).

*Calogale sanguinea*, Gray, *P. Z. S.* 1864, p. 561.

*Hab.* Abyssinia.

#### 6. *Calogale Grantii*.

B.M.

Pale yellow-brown, nearly uniform, very slightly grizzled, with white tips to the hairs; end of tail bay.

*Herpestes badius*, Selater, *P. Z. S.* 1864, p. 100.

*Calogale Grantii*, Gray, *P. Z. S.* 1864, p. 561.

*Hab.* East Africa: Mgunda Mkali (*Capt. Speke*).

\*\*\* Tail-end black, very slender.

#### 7. *Calogale muttigella*.

B.M.

Dark olive-brown, very minutely punctulated; tail-end black. Length of body and head  $13\frac{1}{2}$  inches, of tail  $11\frac{1}{2}$  inches.

*Herpestes muttigella*, Rüpp. *Fauna Abyss.* t. 9. f. 1.

*Calogale muttigella*, Gray, *P. Z. S.* 1864, p. 561.

*Hab.* Abyssinia.

Skull rather elongate, narrow, like that of *C. nyula*; nose flat; forehead and crown in one line; brain-case ovate, flat-topped, contracted in the front over the orbits; orbit incomplete; false grinders



$\frac{2}{3}$  or  $\frac{3}{8}$ , front small, hinder rather compressed, with a small internal and a small hinder acute tubercle; flesh-tooth much longer than broad—inner tubercles small, on front edge; tubercular grinders transverse, the first trigonal, the outer edge broader, the inner narrow, acute; the second very small, nearly like the first in form.

Skull  $2\frac{1}{2}$  inches wide at the broadest part; brain-case 1 inch.

#### 8. *Calogale ornata*.

*Herpestes ornatus*, Peters, Monatsb. Akad. Berlin, 1852, p. 81; *Reise n. Mossamb. Säugeth.* i. p. 117, t. 26, 1852.

*Calogale ornata*, Gray, P. Z. S. 1864, p. 562.

*Hab.* Eastern Africa: Tete, lat.  $17^{\circ}$  (Smith).

The figure is very like *C. mutzigella*; but the grizzling of the back seems to form more irregularly waved cross streaks; perhaps this is only the attempt of the artist to represent the grizzling. The figure of the skull also resembles that of the former species.

Temminck regards this as a variety of *C. mutzigella* (Esq. Zool. p. 116).

#### 9. *Calogale punctulata*.

B.M.

Reddish grey, minutely black- and grey-punctured; face redder; under-fur black; long hairs brown, upper half whitish, with a broad black subapical band and a bay tip; tail-end black; front claws rather slender, acute; inner toes very short, claws short.

*Herpestes punctulatus*, Gray, P. Z. S. 1849, p. 11.

*Herpestes badius*, var. 2, Temm. Esq. Zool. p. 105.

*Calogale punctulata*, Gray, P. Z. S. 1864, p. 562.

*Hab.* South-east Africa: Port Natal (Williams).

Like *C. mutzigella*, but redder; face red-bay.

#### 10. *Calogale melanura*.

B.M.

Reddish brown, minutely punctulate; hair short; tail-end black; front claws acute, short.

*Cynictis melanura*, Martin, P. Z. S. 1830, p. 56; Fraser, Zool. Ty-pica, t.

*Herpestes melanura*, Gray, P. Z. S. 1838, p. 5.

*Herpestes badius*, var. 3, Temm. Esq. Zool. p. 107.

*Calogale melanura*, Gray, P. Z. S. 1864, p. 562.

*Hab.* West Africa, Sierra Leone (Capt. P. L. Strachan); Damara Land (Alexander).

*Var.*? Rather paler (not in good state).

B.M.

*Herpestes ochromeles*, Pucheran (fide Verreaux).

*Hab.* "Central Africa" (Verreaux).

Skull elongate, very much contracted in front over the orbit; the flesh-tooth trigonal, longer than broad; hinder tubercular very minute, transverse.

#### 11. *Calogale badia*.

B.M.

Bright bay, nearly uniform; end of tail black.

Young ? pale brown, with an obscure waved appearance from the broad bands on the hairs.

*Herpestes badius*, *A. Smith, Illust. Zool. S. A. Mamm.* t. 4, ♀.

*Ichneumon ratlamuchi*, *A. Smith, App. Report*, 1836, p. 42.

*Herpestes Cawii*, *A. Smith.*

*Calogale badia*, *Gray, P. Z. S.* 1864, p. 563.

*Hab.* South Africa, on plains away from the sea ; ? Guinea (called "Koukeboe") (*Temm.*), perhaps a variety or species.

Skull rather elongate, compressed ; brain-case elongate, contracted in front ; orbit complete in the adult, incomplete in the young. The false grinders 3.3 ; the first very small ; second compressed, conical ; third subcompressed, placed obliquely, with a very minute, scarcely appreciable internal lobe and no hinder one. Flesh-tooth trigonal, considerably longer than broad ; the internal lobe small, on the front edge. The first tubercular grinder transverse, outer edge oblique, inner (narrower) rounded ; the second very minute, linear, with two tubercles.

M. Temminck thinks that *Herpestes punctatus* and *Oynictis melanura* are varieties of this species (*Temm. Esq. Zool.* p. 100).

#### 12. *Calogale venatica*.

B.M.

Dark bay, white-grizzled, the long hairs white-tipped ; tail-end black.

*Herpestes badius*, var., *Gray, P. Z. S.* 1849, p. 11 ; *Peters, Reise n. Mossamb. Säugeth.* p. 119.

*Calogale venatica*, *Gray, P. Z. S.* 1864, p. 563.

*Hab.* East Africa.

#### 13. *Calogale gracilis*.

B.M.

Brown or blackish brown, scarcely grizzled ; fur on sides of the neck shorter and very minutely grizzled ; end of tail blacker.

*Herpestes gracilis*, *Rüppell, Fauna Abyss.* t. 8. f. 1, t. 10.

*Ichneumia gracilis*, *I. Geoff. Mag. Zool.* 1839, p. 17.

*Ichneumia nigricaudatus*, *I. Geoff. MS.*, l. c. p. 18.

*Calogale gracilis*, *Gray, P. Z. S.* 1864, p. 563.

*Hab.* Abyssinia (*Rüppell*).

#### 14. *Calogale ? thysanura*.

Minor, pilis fusco et pallide luteo annulatis ; pedibus fuscis ; cauda longa, penicillo magno aterrimo terminata.

Length of head and body 12 inches, of tail 13 inches.

*Herpestes thysanurus*, *Wagner, München. gelehrt. Anz.* ix. p. 449.

*Calogale ? thysanura*, *Gray, P. Z. S.* 1864, p. 564.

*Hab.* India : Cashmere.

#### 5. GALERELLA.

Body slender. Legs short. Tail elongate, slender, tapering, covered with shortish hairs. Toes 5.4. Claws short, compressed,



acute. Skull elongate; brain-case rather ventricose. Face short. Teeth 38; false grinders  $\frac{3}{4} \cdot \frac{3}{4}$ ; flesh-tooth triangular, longer than broad; tubercular grinders  $\frac{1}{2} \cdot \frac{1}{2}$ , transverse.

*Galerella*, Gray, P. Z. S. 1864, p. 564.

#### *Galerella ochracea*.

B.M.

Pale brown, minutely punctulated; throat, underside, and inside of the limbs white; tail-end black; front thumb very small, low down.

*Cynictis ochracea*, Gerrard, Cat. Ost. B. M. p. 77.

*Herpestes ochraceus*, Gray, P. Z. S. 1848, p. 138, pl. 8; *Ann. & Mag. N. H.* 1849, iv. p. 376.

*Herpestes mutigigella*, var., Temm. Esq. Zool. p. 116.

*Galerella ochracea*, Gray, P. Z. S. 1864, p. 564.

*Hab.* East Africa: Abyssinia (*F. H. Hora*).

Skull elongate; brain-case rather ventricose; face short, forehead arched; flesh-tooth triangular, much longer than broad, inner tubercle anterior; false grinders  $\frac{3}{4} \cdot \frac{3}{4}$ ; the hinder tubercular very small; orbit incomplete behind; not so contracted in front over the back of the orbit. Like *Calogale badia* in size, but brain-case more ventricose.

M. Temminck regards this as only a seasonal state of *H. mutigigella* (Esq. Zool. p. 116), not observing that it has no internal toe on the hind feet.

#### 6. CALICTIS.

The pupil oblong, transverse. Claws rather arched, compressed. Tail thick, conical, tapering. Ears rounded. Skull elongate, face short. Teeth 40; false grinders  $\frac{3}{4} \cdot \frac{3}{4}$ ; the flesh-tooth triangular, scarcely longer than broad; tubercular grinders  $\frac{1}{2} \cdot \frac{1}{2}$ .

*Calictis*, Gray, P. Z. S. 1864, p. 564.

The skull elongate, rather narrow, much contracted in front of the grain-case; orbit rather incomplete; the nose shelving; crown flat. The false grinders  $\frac{3}{4}$ ; the first very small; second compressed; third trigonal, with a small internal and a small hinder lobe. The flesh-tooth triangular, scarcely longer than broad in front, the inner lobe on the front edge. Tubercular grinders transverse; the first subtrigonal, oblique, much broader than long; the second very minute. The skull 3 inches long, and brain-cavity  $1\frac{1}{2}$  inch broad behind.

#### *Calictis Smithii*.

B.M.

Reddish brown, very closely pale-grizzled, hair with red-brown ends and subconical white bands; feet and tip of tail black.

*Herpestes Smithii*, Gray, Loudon's Mag. N. Hist. 1837, i. p. 2; *Proc. Zool. Soc.* 1851, p. 131, pl. 31.

*Calictis Smithii*, Gray, P. Z. S. 1864, p. 565.

*Hab.* Ceylon (*A. Grace*).

M. Temminck, misled by some dealer, believes that this animal



inhabits Cape Coast and Guinea. He complains of the shortness of my diagnosis; but says himself it is well characterized by a shorter but nearly identical one (see Temm. Esq. Zool. p. 98). (See *Calogale nyula* and *C. nepalensis*, p. 158).

### 7. ARIELA.

Body elongate. Tail slender, elongated, subcylindrical, thickest at the base. Toes 5.5. Skull elongate. Face short. Teeth 40; false grinders  $\frac{2}{3}$ ,  $\frac{2}{3}$ ; flesh-tooth trigonal, rather broader than long, inner lobe long, rounded, on front edge; tubercular grinders  $\frac{2}{1}$ ,  $\frac{2}{1}$ .

Helogale (part.), Gray, P. Z. S. 1861, p. 308.

Ariela, Gray, P. Z. S. 1864, p. 565.

#### Ariela tænionota.

B.M. (skull only).

Hair of head, underpart of neck, and lower part of the extremities short, elsewhere pretty long; centre of the face, forehead, crown, cheeks, and space between the eyes and ears black, freely pencilled with white. Muzzle, upper and lower lips, and space under lower jaw light chestnut; outer surface of the ears brownish, inner surface dirty reddish white; back and sides of neck, shoulders, anterior part of back and sides, and outer surface of anterior extremities finely pencilled black and white; the rest of back and upper part of sides banded transversely deep black and yellowish white or light yellow-brown; flanks and outer surface of hinder extremities towards the body pencilled dull black and yellowish white; lower part of neck, breast, belly, and lower surface of extremities black; tail slender, thickest towards the root, for about two-thirds of its length pencilled black-brown and pale ferruginous, last third nearly uniform black. Length of head and body 15 inches, of tail  $7\frac{1}{2}$  inches.

Helogale tænionota, Gray, P. Z. S. 1861, p. 308.

Herpestes tænionotus, A. Smith, S. African Journ. p. 52, 1834.

Herpestes zebra (partly), Schinz, Syn. Mamm. i. p. 371.

Ichneumon tænionotus, A. Smith, S. Afr. Quart. Journ. p. 50.

Ariela tænionota, Gray, P. Z. S. 1864, p. 565.

Hab. South Africa: Natal (A. Smith).

The flesh-tooth broader than long; the inner lobe long, rounded, on the front edge. The first false grinder conical, compressed; the second trigonal, with an internal tubercle. The tubercular grinders transverse; the first large, with a long internal lobe, rather thinner, narrower than the outer edge, and rounded within. Orbit incomplete behind. Skull elongate.

### 8. ICHNEUMIA.

Body compressed. Legs rather long. Fur grizzled. Tail conical, bushy. Toes 5.5. Claws rather elongate, sharp. The greater part of the soles of the hind feet are covered with hair. Teeth 40; false grinders  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; flesh-tooth triangular; tubercular grinders  $\frac{2}{1}$ ,  $\frac{2}{1}$ .

*Ichneumia*, I. Geoff. *Compt. Rend.* 1837, p. 582; *Mag. Zool.* 1839, pp. 13 & 31; *Gray, P. Z. S.* 1864, p. 566.

*Lasiopus*, E. Geoff. *Cours del' Hist. Nat. des Mamm.* p. 57, 1835.

The most Viverrine form of this family.

M. Geoffroy separates this genus on account of its peculiar dentition, which he describes:—false grinders  $\frac{3}{4}$ , true  $\frac{1}{4}$ , tubercular  $\frac{2}{4}$  (*Mag. Zool.* 1839, p. 13). M. Geoffroy's figures are lower on their legs and more vermiform than our specimen of *I. albicauda*.

Dr. A. Smith, when first describing this species, observed, "Its teeth exhibit a slight difference in form, and are not so closely set as in the true *Ichneumons*. This peculiarity, in addition to the state of the soles of the feet, may, when its manners and habits are better known, require it to be separated from the present genus" (*South African Quart. Journ.* p. 52, 1834).

"Shorter and more robust, and stands higher on its limbs, than *Herpestes*."—A. Smith.

### 1. *Ichneumia albicauda*.

B.M.

Tail white nearly to the base.

*Ichneumia albicauda*, I. Geoff. *Mag. Zool.* 1839, pp. 13, 35, t. 11; *Gray, P. Z. S.* 1864, p. 566.

*Herpestes albicaudus*, Cuvier, *Règ. Anim.* ed. 2, 1834.

*Herpestes albicaudatus*, A. Smith, *S. Afr. Quart. Journ.* p. 181, 1834.

*Mangusta albicauda*, De Blainv. *Ostéogr. Viverra*, t. 12 (teeth).

*Hab.* Africa: Port Natal (A. Smith); Senegal (Heudelot); Gambia (Delambre).

### 2. *Ichneumia leucura*.

*Herpestes leucurus*, Ehrenb. *Sym. Phys. Mamm.* t. 12, cop. Schreb. *Säugeth.* t. 116.

*Ichneumia leucura*, Gray, *P. Z. S.* 1864, p. 566.

*Hab.* East Africa: Nubia and Dongola (Ehrenb.).

This may be the same as the preceding. See observations of M. I. Geoffroy, *Mag. Zool.* 1839, p. 14, note.

### 3. *Ichneumia albescens*.

Pale brown; tip of tail white.

*Ichneumia albescens*, I. Geoff. *Mag. Zool.* 1839, p. 35, t. 12; *Gray, P. Z. S.* 1864, p. 566.

*Hab.* East Africa: Sennaar (Botta).

Skull ovate, swollen; the brain-cavity one-half the length; nose shelving; forehead and crown rather convex; orbit incomplete behind. False grinders  $\frac{3}{4}$ ; the third triangular, sides of equal length, with an internal tubercle on the hinder edge. The flesh-tooth triangular, rather longer than wide in front, narrow behind; the internal tubercle anterior, rounded internally. The tubercular grinders large, oblong, trigonal, about half as wide again as long; the hinder rather the smallest (see I. Geoff. *Mag. Zool.* 1839, t. 13).



In the figure the brain-cavity is half the length of the skull, and the skull is as wide at the widest part of the zygomatic arch as the length of the brain-cavity.

#### 4. *Ichneumia nigricauda*.

*Ichneumia nigricauda*, *Pucheran, Rev. et Mag. Zool.* vii. p. 39; *Gray, P. Z. S.* 1864, p. 567.

*Hab.* Senegal.

#### 9. BDEOGALE.

Toes 4. 4, short. Heel hairy to the soles. Claws compressed. Tail bushy. Skull, orbits incomplete behind (*Peters*, t. 27 & 28). False grinders 3. 3; hinder broad, triangular. Flesh-tooth triangular, broad; sides nearly equal; angles rounded (t. 27. f. 4). *Hab.* Africa.

*Bdeogale*, *W. Peters, Reise n. Mossamb. Mamm.* p. 119 (1850); *Gray, P. Z. S.* 1864, p. 567.

The teeth are like those of *Rhinogale*, and the nose is rather produced and rounded below in the figure; so that perhaps this genus ought to be arranged near to it; but it differs from it in having four toes on each foot.

##### 1. *Bdeogale crassicauda*.

Blackish-ashy hair, black- and white-ringed; limbs and tail black.

*Bdeogale crassicauda*, *W. Peters, Monatsb. K. Akad. Berl.* 1852, p. 81; *Reise n. Mossamb. Mamm.* p. 120, t. 27; *Gray, P. Z. S.* 1864, p. 567.

*Hab.* East Africa: Tete, Boror (*Peters, Mus. Berlin*).

##### 2. *Bdeogale puisa*.

Brown hairs, black- and yellow-ringed; limbs and tail blackish brown.

*Bdeogale puisa*, *W. Peters, Monatsb. K. Akad. Berl.* 1852, p. 82; *Reise n. Mossamb. Mamm.* p. 124, t. 28; *Gray, P. Z. S.* 1864, p. 567.

*Hab.* East Africa: Mossimboa (*Peters, Mus. Berlin*).

##### 3. *Bdeogale nigripes*.

"Body whitish; tail snow-white; feet black."

*Bdeogale nigripes*, *Pucheran, Rev. et Mag. Zool.* vii. p. 111; *Gray, P. Z. S.* 1864, p. 567.

*Hab.* Gaboon (*Aubry Lecomte, Mus. Paris*).

"Larger than the other species."

#### 10. URVA.

Head broad. Ears rounded. Nose rather produced, with a longitudinal groove beneath. Pupil linear, erect? round?—*Hodgson*. Body elongate. Legs short. Tail conical, attenuated, covered with



long hairs. Toes 5.5; claws compressed, rather short, curved; inner toes of fore and hind feet very short, with short claws rather high up the foot. Claws brown. Hind part of the soles of hind feet covered with hair, which is bent towards the centre on each side; the front part bald, oblong, narrow behind, occupying less than two-thirds of the foot, with three subequal pads in front and two elongated pads on each side of the hinder edge (Hodgson, J. A. S. B. t. 31. f. 5). Front upper false grinders 2, compressed; the third subtriangular, with a very small subposterior internal tubercle, and a small posterior marginal one; flesh-tooth large, elongate, triangular, nearly twice as long as the front margin, with a large internal lobe on the front edge; tubercular grinders transverse, twice as broad as long on the outer edge; hinder tubercular very small.

*Urva*, Hodgson; Gray, *Cat. Mam. B. M.* p. 50; *P. Z. S.* 1864, p. 568.  
*Mesobema*, Hodgson.

#### *Urva cancrivora.* (The *Urva*.)

B.M.

Black, grizzled, hairs with a very broad white subterminal ring; a white streak on the side of the neck; legs and feet black; tail ashy red at the end.

*Urva cancrivora*, Hodgson, *Journ. Asiat. Soc. Beng.* vi. p. 560; Gray, *P. Z. S.* 1864, p. 568.

*Mesobema cancrivorus*, Hodgson, *Journ. Asiat. Soc. Bengal*, x. p. 910  
*Calcutta Journ. N. H.* ii. p. 214, iv. p. 287.

*Gulo urva*, Hodgson, *Journ. Asiat. Soc. Beng.* v. p. 238; *Calcutt Journ. N. H.* ii. p. 45, t. 13½. f. 2.

*Hab.* India—Nepal, in caverns, Central Northern region (*Hodgson*); Affghanistan (*Griffith*); Arakan (*Blyth*).

Fur lax, elongate, ringed, blackish ashy, more or less grizzled by the white tips to the hairs; lips and cheeks whitish; a long streak on the side of neck white; legs and feet black; tail bushy, appearing more or less irregularly banded from the dark band on the hairs.

The not quite adult skull of *Urva cancrivora* is very like that of *Tæniogale vitticollis*, but considerably smaller. The orbit is incomplete; the zygomatic arches not so bowed out, with the most convex part nearer the hinder end. The nose is rather thick. The contraction of the brain-case is just over the hinder part of the orbit; the brain-case is rather longer (perhaps  $\frac{1}{10}$ ) than the face. The teeth are normal, and very like in form and proportion to those of *T. vitticollis*; but they are rather narrower, and the first tubercular molar is shorter and broader, more oblong, and the hinder tubercular molar smaller. Length of the skull  $3\frac{1}{2}$  inches; width of the brain-case  $1\frac{1}{8}$  inch, of the zygomatic arch 2 inches.

Lower jaw slender; chin gradually shelving; the lower edge curved, arched up behind, to near the condyle. The false grinders 4.4; the front small, concave. Tubercular grinders moderate, oblong, elongate, with two small anterior and two large high posterior prominences.

In the 'Illustrations of Indian Zoology' I figured an animal under the name of *Viverra? fusca*, from one of General Hardwick's drawings. In the 'Ann. & Mag. Nat. Hist.' 1842, p. 260, I proposed for it a genus named *Osmetectis*. As yet I have never seen or heard of an animal from India that agrees with the figure. It has been supposed that it may be *Urva cancrivora* of Hodgson; but it does not well represent that species.

### 11. TÆNIOGALE.

Whiskers weak, slender. Nose grooved beneath. Toes 5.5. Claws compressed, rather elongate, very acute. Thumb short; claw distinct, rather elevated. Great toes very short, indistinct, with a small claw; hinder claws broader. Soles of the hind feet quite bald to the heel. Ears rounded. Skull oval. Teeth 42; false grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ , first conical, second and third with three unequal tubercles; tubercular grinders  $\frac{2}{4}$ .  $\frac{2}{4}$ , first upper triangular, large, second short, twice as broad as long (Ogilby, *l. c.*).

Mungos, sp.?, *Ogilby*, *P. Z. S.* 1835, p. 103.

Tæniogale, *Gray*, *P. Z. S.* 1864, p. 569.

Mr. Ogilby described this animal as having 42 teeth, 3 false grinders in the upper, and 4 in the lower jaw. Perhaps one tooth in the lower jaw was changing.

#### Tæniogale vitticollis.

B.M.

Black, red-washed; hair very long, soft, black, with long red tips; head black, minutely punctulated; legs and feet black; tail black; streak on side of throat black; the front claw elongate, compressed, arched.

Mungos vitticollis, *Gray*, *Cat. Mam. B. M.* p. 50 (not *Ogilby*).

Herpestes vitticollis, *Bennett*, *P. Z. S.* 1835, p. 67; *Madras Journ.* 1839, p. 103, t. 2.

Mangusta vitticollis, *Elliot*, *Madras Journ. of Lit. & Sci.* 1840, p. 12, t. 1; *De Blainv. Ostéogr.* p. 48, t. 96.

Mungos? vitticollis, *Ogilby*, *P. Z. S.* 1835, p. 103.

Tæniogale vitticollis, *Gray*, *P. Z. S.* 1864, p. 569.

*Hab.* India: Madras, in thick forests (*W. Elliot*); Travancore (*P. Poole*).

Varies in the greyness of the fur and the extent and darkness of the red-bay on the sides of the neck and body, there being least on the specimens that have the most grey and distinctly white rigid hairs. In some specimens (perhaps in some seasons) the whole animal has a bright bay tint from the tips of the longest hairs.

The skull is elongate, like that of *Athylax paludosus*; but the brain-case is more ventricose and higher, and the orbit smaller and complete behind. The zygomatic arch is rather short and very much bowed out, the most convex part of the arch being rather behind the middle of its length. The contraction of the brain-case is rather behind the back of the orbit. The teeth are normal, nearly



as massive as, and agreeing very generally in proportion of parts and position or form of the internal lobes with, those of *A. paludosus*; but they are rather slender and longer comparatively in all their parts. The palate also is much narrower and longer. The third upper false molar has a small central internal lobe. The front edge of the flesh-tooth is fully two-thirds the length of the outer edge; the hinder lobe of it is narrow, and angular behind. The front tubercular molar has a very oblique outer edge. The brain-case is rather more than half the entire length.

The length of the skull  $3\frac{3}{4}$  inches; the width of the brain-case  $1\frac{5}{16}$  inch, of the zygomatic arch  $2\frac{1}{4}$  inches.

The lower jaw broad in front, narrow behind, without any tubercles on the lower edge under the end of the tooth-line. False grinders 4.4; the front very small, curved, close at the front of the second. The tubercular grinder very large, oblong, subcircular, with two large unequal tubercles on the front and a very large one on the hinder part of the crown.

The lower jaw is distinguished from that of the genus *Herpestes* by having no prominence or tubercle on the lower edge under the hinder end of the tooth-line.

## 12. ONYCHOGALE.

Body slender. Tail conical, hairy, about as long as the body. Toes 5.5; inner toes small; front claws very long, compressed, curved. Teeth 40; false grinders  $\frac{3}{4}.\frac{3}{4}$ .

*Onychogale*, Gray, *P. Z. S.* 1864, p. 570.

The hinder end of the skull deeply and sharply notched, instead of being transversely truncated as in the small *Herpestes*. The notch in the living animal is filled up with a cartilaginous septum.

### *Onychogale Maccarthiæ*.

B.M.

Red-brown; hair elongate, flaccid, pale brown, with a broad, thick, subterminal band and a long whitish-brown tip; fur of hands and face shorter. Feet blackish brown; hair white-tipped. Tail redder; hair elongate, red, one-coloured. Ears rounded, hairy.

*Herpestes Maccarthiæ*, Gray, *B. M.*; *Gerrard, Cat. of Bones B. M.* p. 75.

*Cynictis Maccarthiæ*, Gray, *P. Z. S.* 1851, p. 131, *Mamm.* pl. 31; *Ann. & Mag. N. H.* 1853, xii. p. 47.

*Herpestes fulvescens*, Kelaart, *Ceylon*.

*Onychogale Maccarthiæ*, Gray, *P. Z. S.* 1864, p. 570.

*Hab.* Ceylon (*Lady Maccarthy*).

## 13. HELOGALE.

Body slender. Head oval. Ears distant. Toes 5.5; the inner toe small; front claws rather elongate, compressed, acute. Soles of the hind feet partly bald. Tail conical, covered with elongate hairs.



Skull short, broad. Face short. Teeth 36 (see P. Z. S. 1861, p. 308, fig.); false grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ ; the flesh-tooth triangular; tubercular grinders  $\frac{2}{1}$ .  $\frac{2}{1}$ .

*Helogale*, Gray, P. Z. S. 1861, p. 308; 1864, p. 570.

*Herpestes tenionotus*, A. Smith, which I referred to this genus, is distinct.

### 1. *Helogale parvula*.

B.M.

Fur uniform blackish brown, very minutely pale-punctulated. Length of body and head 7 inches, of tail 7 inches.

*Helogale parvula*, Gray, P. Z. S. 1861, p. 308 (fig. skull); 1864, p. 571.

*Herpestes parvulus*, Sundevall; Temm. Esq. Zool. p. 110.

*Hab.* South Africa: Port Natal (*Sundeval*).

The skull moderate, swollen; brain-cavity ovate, contracted over the back of the orbit; nose arched; orbit incomplete behind; false grinders  $\frac{2}{3}$ , front compressed, moderate, second trigonal; flesh-tooth small, broader than long, with the inner tubercle on the front edge; tubercular grinders transverse, much broader than long, the hinder about half the size of the other.

### 2. *Helogale undulata*.

"*H. nigro et rufo-flavido undulatus, subtus undique rufus; cauda corpore brevior, sine penicillo.*"

*Herpestes undulatus*, Peters, *Reise nach Mossamb. Säugeth.* p. 114, t. 25, 1852.

*Helogale undulata*, Gray, P. Z. S. 1864, p. 571.

*Hab.* Eastern Africa: Mossambique; Quitangonka; from lat. 10° to 15° S.

The grinders  $\frac{5}{3}$ ; the front claw much longer than the hinder; the skull ventricose, with a short nose. Allied to *Herpestes microcephalus*, according to Temm. Esq. Zool. p. 118.

## Tribe II. CYNICTIDINA.

Head short, ventricose; tail bushy, expanded laterally; claws elongate; orbit of the skull complete behind.—Gray, P. Z. S. 1864, p. 571.

### 14. CYNICTIS.

Body slender. Ears short, rounded. Nose truncate, with a distinct central longitudinal groove. Tail with long hairs, flattened horizontally. Legs short. Toes 5.4; front claws elongate, compressed, arched. Soles of feet partly covered with hair. Skull short and broad, ventricose. Face moderate; forehead swollen. Teeth

38; false grinders  $\frac{3}{8}$ .  $\frac{3}{8}$ ; flesh-tooth triangular, sides subequal; tubercular grinders  $\frac{1}{2}$ .  $\frac{1}{2}$ .

*Cynictis*, *Ogilby*, *P. Z. S.* 1833, p. 48; *Gray*, 1864, p. 571.

### 1. *Cynictis penicillata*.

B.M.

The under-fur short, soft, and black.

*Mangusta penicillata*, *Cuvier*, *Règ. Anim.* (ed. 2); *De Blainv. Ostéogr. Viverra*, t. 12 (teeth).

*Ichneumia albescens*, *I. Geoff. Mag. Zool.* 1839, t. 12 (not descrip.).

*Mangusta Levallantii*, *A. Smith, Zool. Journ.*

*Cynictis typicus*, *A. Smith, South Afr. Quart. Journ.* i. p. 53.

*Cynictis Steedmanii*, *Ogilby*, *P. Z. S.* 1833, p. 49; *Trans. Zool. Soc.* 1835, i. p. 34, t. 3 (a skull).

*Cynictis Levallantii*, *Gray, Cat. Mamm. B. M.* p. 53.

*Cynictis penicillata*, *Gray, P. Z. S.* 1864, p. 572.

*Meeskal, Barrow, Trav.; Swains. Lard. Ency.* p. 159. f. 71.

*Mangusta (Cynictes) penicillata*, *De Blainv. Ost.* t. 5.

*Var.* redder.

*Ichneumia ruber*, *Geoff.*

*Herpestes ruber*, *Licht. Mus. Berlin.*

*Hab.* South Africa (*Steedman*).

The skull short and curved; the forehead convex; brain-cavity rather swollen; upper false grinders  $\frac{3}{8}$ , the first very small, the third trigonal; the flesh-tooth rather longer than broad; the tubercular grinders transverse, very short and broad, the last small.

Skull broad, the width about two-thirds the entire length; the brain-case half the entire length; orbit complete behind; forehead convex, especially between and in front of the eyes. The two front upper false grinders compressed; the third subtrigonal, with a small central internal lobe; the flesh-tooth longer than broad on the front margin; the false grinder transverse, short, and very broad, subtrigonal, widest on the outer edge, the hinder much smaller.

The skull of a younger animal very similar, but larger, and the forehead not so convex and swollen before and between the eyes.

*Ichneumon rubra* (*Geoff. l. c.* p. 139), "Very splendid ferruginous red, especially the head," is said to be *Cynictis Steedmanii*, *Licht.*

### 2. *Cynictis Ogilbii*.

B.M.

Yellow, black- and white-pencilled; beneath whitish; chin, throat, and tip of tail white; ears reddish brown.

*Cynictis Ogilbii*, *A. Smith, S. Afr. Quart. Journ.* i. p. 53; *Illust. Z. S. Africa, Mamm.* t. 16, ♂; *Gray, P. Z. S.* 1864, p. 572.

*Hab.* South Africa: barren plains, north part of Graaf Reynet district and Bushman Flat (passes a great part of its time underground (*A. Smith*).

Skull very like that of *C. penicillata* (803 c); but the forehead not so convex, and the skull, though longer, is rather narrower at the zygomatic arch; the brain-cavity of the two of the same width;



in the most swollen part more like 803 *a*. The flesh-tooth is similar to that of *C. penicillata*.

### 3. *Cynictis? fimbriata*.

Fur very pale, whitish; hairs white at the base, silky, with black and white bands and a white tip; below dirty white. The black and white rings on the silky hair of the tail are broader; the lateral hairs and the tuft at the tip are tipped by an isabella band. The feet pale brown, dotted with white.

Length of body and head 11 inches.

*Herpestes fimbriatus*, Temm. *Esq. Zool.* p. 112.

*Cynictis fimbriata*, Gray, *P. Z. S.* 1864, p. 573.

*Hab.* India (? Temm., *Mus. Leyden*).

The account of the tail would lead us to believe that this is a *Cynictis*: but the under-fur of that animal, even in the very young state, is black.

### 4. *Cynictis leptura*.

B.M.

Pale foxy brown, brown-pencilled; lips, chin, and tip of the tail white; tail fulvous, grizzled with chestnut-brown, hair with a broad central chestnut-brown ring; underside yellowish white.

*Cynictis leptura*, A. Smith, *Illustr. Zool. S. Africa, Mamm.* t. 17; Gray, *P. Z. S.* 1864, p. 573.

*Cynictis Levillantii*, var., Gerrard, *Cat. Bones B. M.* p. 77.

*Hab.* South Africa, in barren places.

The skull of *Cynictis leptura* (803 *e*, A. Smith) is very like that of *C. penicillata* (803 *c*); the forehead is convex before and between the eyes, and the teeth are very similar; but the flesh-tooth is much shorter compared with the width of the front margin, more equally triangular, as the front lobe on the inner edge is longer compared with the rest of the tooth; the hinder tubercular is rather wider and more like the front one.

## Fam. 9. RHINO GALIDÆ.

Tubercular grinders two on each side of the upper, and one on each side of the lower jaw. Nose produced, underside convex, covered with short adpressed hairs, without any central longitudinal groove. The toes linear, separate, extended. Claws blunt, fore one often elongated. Soles of the hind feet bald, or slightly covered with hair. The fur rigid, grizzled. Tail not ringed.

Viverridæ, § Rhinogaleacea, Gray, *P. Z. S.* 1864, p. 573.

Daubenton, in the description of the Suricate (*Hist. Nat.* xiii. p. 75), observes, "Les narines ressemblent à celles du chien; mais



le nez n'avait pas, comme celui du chien, un sillon qui s'étendit depuis l'entre-deux des narines jusqu'à la lèvre; cet espace était convexe." The character here described does not seem to have been remarked, since, indeed, I only accidentally discovered that Daubenton had observed it, long after I had seen its importance as a characteristic in a group allied to Viverridæ. The same character is found in the Mangouste figured by M. Daubenton (t. 19); but he does not notice it in his short description of a living female of that animal.

*Synopsis of the Genera.*

Tribe 1. **Rhinogalina.** Head elongate. Nose short. Teeth 40. False grinders  $\frac{3}{2}$ .

1. RHINOGALE. Tail conical. Toes 5.5. Front claws short.
2. MUNGOS. Tail conical. Toes 5.5. Front claws elongate.

Tribe 2. **Crossarchina.** Head ventricose. Nose elongate. Teeth 36. False grinders  $\frac{3}{2}$ .  $\frac{3}{2}$ .

3. CROSSARCHUS. Toes 5.5. Claws hooked. Hind soles bald.
4. EUPLERES. Toes 5.5. Claws short, hooked. Hind soles hairy.
5. SURICATA. Toes 5.4. Claws elongate, slender. Hind soles hairy.

Tribe I. RHINO GALINA.

Nose short; teeth 40; tubercular grinders  $\frac{2}{2}$ .

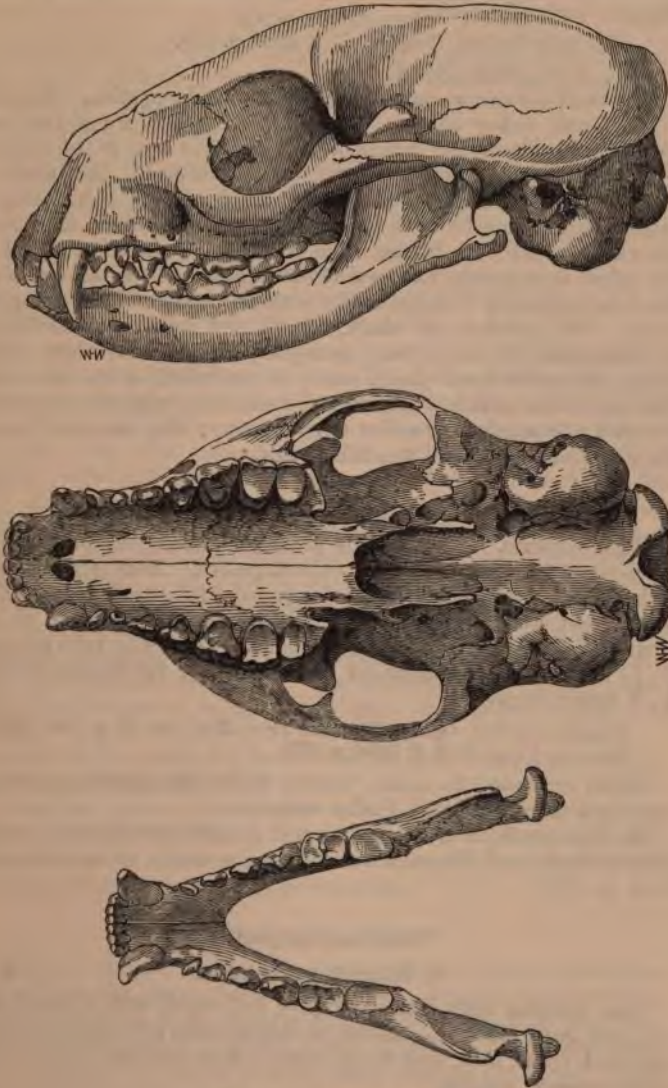
1. RHINOGALE.

Head ovate. Nose shortly produced, convex beneath. Body elongate. Toes 5.5. Claws short, compressed, acute. Tail conical, covered with elongated hair. Skull elongate, ventricose. The orbit incomplete on the hinder edge. Teeth 40. False grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ . Flesh-tooth triangular, broad, angle rounded; inner tubercle broad, near the middle, and occupying the greater part of the inner side. Tubercular grinders  $\frac{2}{2}$ .  $\frac{2}{2}$ ; upper broad, transverse, rounded on the side, only half as long as wide.

Rhinogale, *Gray, P. Z. S.* 1864, p. 573.

This genus, in the prolongation of the nose, has some affinity to *Crossarchus* and *Suricata*; but the elongation is much less developed.

Fig. 22.



Skull of *Rhinogale Melleri*.

**Rhinogale Melleri.**

**B.M.**

Grey-brown, very minutely and closely white-speckled; the middle of the hinder part of the back with an obscure, broad, darker longi-

tudinal streak; tail (all but the base) black; nose and feet rather brown; under-fur brown.

Rhinogale Melleri, *Gray, P. Z. S.* 1864, p. 575.

*Hab.* East Africa (*Dr. Meller*).

The skull is narrow, more especially the hinder portion. The face is short and rather narrow. The forehead and crown of the head form a gradually arched line from the end of the nose to the occiput. The cavities for the temporal muscles are moderate; they meet on the crown, just over the hinder edge of the zygomatic arch, leaving a large lozenge-shaped convex forehead between the orbits. The orbits are rather small, the hinder edge incomplete; the hinder part of the palate between the temporal muscles moderately broad and short, the hinder opening being in a line with the middle of the temporal fossæ. The grinders are short, broad, and solid; the carnassier is triangular, the sides very nearly equal, the inner lobe being broad and rounded and placed nearly in the middle of the outer side. The tubercular grinders are oblong, transverse, with the inner side rounded and nearly as broad as the outer one; they are much worn, showing that the animal was fully adult.

## 2. MUNGOS.

Head elongate. Nose slightly produced; underside convex, with close-pressed hairs, without any central groove. Body slender. Fur rather harsh. Tail subcylindrical, covered with harsh hairs. Toes 5.5; front inner toe strong, hinder smaller. Claws strong, acute; front rather elongate, compressed, arched. Teeth 40; false grinders  $2 \frac{2}{4} \cdot 2 \frac{2}{4}$ ; flesh-tooth triangular, as broad as long; tubercular grinders  $2 \frac{2}{4} \cdot 2 \frac{2}{4}$ , upper transverse.

Mungos (partly), *Ogilby, MS.* (see *Proc. Zool. Soc.* iii. p. 103, 1835).

Mungos, *Gray, P. Z. S.* 1864, p. 575.

Ogilby separated the genus, because in the two African species he examined there were only  $2 \frac{2}{4}$  false molars.

M. Temminck, overlooking several organic peculiarities, unites these animals and *Herpestes vitticollis* as a single species (see *Esq. Zool.* p. 111).

\* Back and tail grizzled.

### 1. Mungos gambianus.

B.M.

Grey, grizzled with black and grey, hair rigid, with a broad pale ring and large black tip; streak on side of neck, feet, and end of the tail black; lips, chin, and throat white; belly reddish; hair of hind limbs elongate, reddish.

Young greyer; the black tips of the hairs shorter.

*Herpestes* (Mungos) *gambianus*, *Ogilby, P. Z. S.* 1835, p. 102; *Schinz, Syn. Mamm.* i. p. 374; *Temm. Esq. Zool.* p. 111.

Mungos *gambianus*, *Gray, Cat. Mamm. B. M.* p. 50; *P. Z. S.* 1864, p. 575.

*Hab.* West Africa; Gambia (*Rendall*).



\*\* *Back cross-banded; tail obscurely ringed.*

## 2. *Mungos fasciatus.*

B.M.

Blackish, minutely grizzled with ashy; back and rump washed with reddish, with many blackish and white cross bands; nose, feet, and end of tail blackish.

Young paler, obscurely cross-banded.

*Mungos fasciatus*, Gray, *Cat. Mamm. B. M.*; *P. Z. S.* 1864, p. 576.

*Viverra ichneumon*, Schreb. *Säugeth.* t. 116 (from Buff.).

*Herpestes fasciatus*, Desm. *Dict. S. N.* xxix, p. 58.

*Herpestes mungo*, Desm. *Mamm.* p. 211.

*Herpestes zebra*, Rüppell, *Fauna Abyss.* t. 9. f. 2.

*Ryzena suricata*, Children, *Clapperton's Trav. Append.*

*Herpestes (Mungos) fasciatus*, Ogilby, *P. Z. S.* 1835, p. 102.

*Mangusta mungo*, Fisch. *Syn. Mamm.* p. 163.

*Hab.* Africa: Cape of Good Hope (*A. Smith*); Lake Tschad (*Clapperton*); Gambia (*Rendall*); Abyssinia (called "Gottoni") (*Rüppell*).

The not quite adult skull is rather elongate, ventricose behind, the contraction of the brain-case being in a line with the hinder part of the orbit. The orbit imperfect behind. The zygomatic arch moderately bowed out, the more convex part being nearer the hinder end. The nose tapering on the side and above, making a shelving forehead and a slightly arched crown-line. The false molars are only two on each side, there being a short space between them and the base of the canine; the second false grinder triangular, with a good-sized lobe on the inner part of the hinder edge, and with only a very rudimentary point on the hinder outer margin. The flesh-tooth triangular, the front edge being as broad as the outer one, with a large, thick, rounded inner lobe. The first tubercular grinder transverse, short, narrowed on the inner edge; the second similar, but smaller.

Length of the skull  $2\frac{7}{12}$  inches; width of the brain-case 1 inch, of the zygomatic arch  $1\frac{1}{2}$  inch.

Lower jaw rather slender, with a rounded angle under the condyle. The false grinders  $\frac{3}{4}$ ; the first compressed, sharp-edged. Tubercular grinders rather large, with two high lateral anterior and one large posterior rather high prominence.

## 3. *Mungos adailensis.*

"Cinereo-flavicans, pilis nigro-fusco annulatis, vertice cerviceque nigro-schistaceis, dorso fasciis transversis obsoletis nigricantibus; abdomine dilutiore, in flavidum vergente; antepedibus obscurioribus; cauda corpore parum longiore, apice attenuata haud penicillata, dorso concolori, in ultimo triente nigra, plantis denudatis; oculis pupilla vertico-elliptica, iride fusca.

"Long. tota  $22\frac{1}{2}$ , caudæ 15 poll."

*Herpestes adailensis*, Heuglin, *Petern. Mittheil.* 1861, p. 17; *Nova Act. Acad. Leop.* xxviii, p. 5, t. 2. f. 4 (skull).

*Mungos adailensis*, Gray, *P. Z. S.* 1864, p. 576.

*Hab.* Adail coast (*Heuglin*).

I do not see how this differs from *M. fasciatus*; but Herr Heuglin has them both in his list.

## Tribe II. CROSSARCHINA.

Nose elongate; teeth 36; tubercular grinders  $\frac{2}{1}$ .

### 3. CROSSARCHUS.

Head roundish. Nose elongate, much produced; the underside convex, hairy, without any central longitudinal groove; hair rigid, short, shorter on the head and throat; muffle large, callous. Pupil round. Ears rounded. Body slender. Fur harsh, with longer and more rigid hairs. Tail slightly compressed, tapering, covered with shorter hair. Toes 5.5, free; two middle toes longest; front inner toe large, hinder smaller. Soles naked. Claws rather elongated, compressed, hooked, acute, sometimes very much so. Teeth 36; false grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ ; flesh-teeth  $\frac{1}{1}$ .  $\frac{1}{1}$ ; tubercular grinders  $\frac{2}{1}$ .  $\frac{2}{1}$ .

*Crossarchus*, *F. Cuv. Mamm. Lithog.* iii. p. 47, 1825; *Gray, P. Z. S.* 1864, p. 577.

#### *Crossarchus obscurus*.

B.M.

Uniform deep brown; head rather paler; hairs brown, with yellow tips.

Length of body and head 12 inches, of tail 7 inches.

*Crossarchus obscurus*, *Cuv. R. A. i.* p. 158; *Martin, P. Z. S.* 1834, p. 114 (anat.); *De Blainv. Ostéogr.* pp. 49, 99, t. 12; *Gray, P. Z. S.* 1864, p. 577.

*Crossarchus typicus*, *A. Smith, S. African Quart. Journ.* ii. p. 135.

"*Crossarchus dubius*, *F. Cuv.*," *A. Smith.*

*La Mangue, F. Cuvier, Mamm. Lithogr.* ii. pl. 199.

*Hab.* Western Africa: Guinea (called "Aevisa"), living in deep holes with many openings (*Temm.*). Eastern Africa?

See *Crossarchus rubiginosus*, *Wagner, Suppl. Schreb.* ii. p. 329. Bay-brown; feet and tip of the tail black. Length  $16\frac{1}{2}$  inches, of tail 12 inches.

*Hab.* East Indies (*Wagner*).

### 4. EUPLERES.

Skull ventricose, very much produced, slender, compressed; lower jaw compressed and produced in front. Nose elongate, slender, acute, probosciform; underside —, with a small muffle. Eyes large. Ears large and triangular. Body vermiform. Legs moderate. Tarsi elongate, hairy beneath; a very slender bald streak to the heel, like *Genetta*, but not so distinct. Toes 5.5, apparently united, with scattered hairs above; thumb very short; great toe short and high up. Claws acute, semiretractile. Fur thick, formed of silky hairs, with a short close under-fur. Tail elongate, cylindrical, rather tapering, covered with hair. Cutting teeth  $\frac{2}{2}$ ; canines small, compressed; false grinders 3, very small, compressed, far



apart, the hinder with a small central internal lobe; the flesh-tooth triangular, about as long as wide, the inner lobe central; tubercular grinder trigonal, somewhat like the flesh-tooth (see De Blainv. *Ostéogr. Viverra*, t. 8. f. 1-4, from a young animal).

*Eupleres*, Doyère, *Ann. Sci. Nat.* 1835, iv. p. 281; *De Blainv. Ostéogr. Viverra*, t. 8; Gray, *P. Z. S.* 1864, p. 577.

According to M. de Blainville's figure of the skull, this genus (which I have never been able to examine) was properly referred by Flacourt, who first noticed it, to the Civets.

M. Doyère referred it to the Insectivora (see *Ann. Sci. Nat.* iv. 278); but, to make this alliance, he considers the front double-rooted tooth in the lower jaw a canine.

M. de Blainville, in his essay on Mamm. Insectivores, in 'Annales Fr. et Etrang. d'Anat. et de Physiol.' ii. p. 1, justly observes, "the *Eupleres*, which has been referred to the Insectivora, on examination has proved to be allied to *Mangusta*, or to the section *Genetta* of the *Viverridae*" (*l. c.* p. 37).

#### *Eupleres Goudotii*.

Fur very dark brown; under-fur fulvous, with black transverse streaks over the shoulder; throat and beneath whitish.

*Eupleres Goudotii*, Doyère, *Ann. Sci. Nat.* 1835, iv. p. 281, t. 18 (animal and skull); *De Blainv. Ostéogr. Viverra*, t. 8 (skull); Gray, *P. Z. S.* 1864, p. 578.

Falanouc, Flacourt, Madagascar.

Length 12 inches, of tail 5 inches.

*Hab.* Madagascar, at Tamatave, in burrows (called "Falanouc") (*Goudot*) (*Mus. Paris*).

#### 5. SURICATA.

Head spherical. Nose elongate, produced; underside hairy, convex, without any central groove; muffle callous; nostril long, opening on the sides. Ears rounded, nakedish internally. Body elongate; hair soft, annulated. Legs moderate. Toes 4.4; hind soles hairy. Claws long; front very long, slender, compressed, arched; anal glands two. Tail tapering, slender, covered with short hair, and rather pencilled at the tip. Teeth 36; false grinders  $\frac{2}{3} \cdot \frac{2}{3}$ ; flesh-teeth  $\frac{1}{1} \cdot \frac{1}{1}$ ; tubercular grinders  $\frac{2}{1} \cdot \frac{2}{1}$ .

*Suricata*, Desm. *N. Dict. H. N.* xxiv. p. 16, 1804; Gray, *P. Z. S.* 1864, p. 578.

*Ryzæna*, Illiger, *Prodr. Mamm.* 1812.

#### *Suricata zenick*.

B.M.

Grey; orbit and tip of the tail black; hinder part of the back with dark cross bands; chin, throat, and vent whitish; tail rather redder, underside lighter, under-fur reddish.

*Suricata zenick*, Gray, *Cat. Mamm. B. M.* p. 53; *P. Z. S.* 1864, p. 578. *Viverra suricata*, Erzl. *Syst.* p. 488.



- Viverra tetradactyla*, Pallas; Schreb. *Säugeth.* t. 117 (from Buffon).  
*Suricata viverrina*, Desm. *N. Dict. H. N.* xxxii. p. 297.  
*Suricata capensis*, Desm. *Mamm.* p. 214.  
*Viverra zenick*, Gmel. *S. N.* i. p. 92 (from Sonn.).  
*Mangusta* (*Suricata*) *tetradactyla*, De Blainv. *Ostéogr.* p. 28, t. 5. f. 12.  
*Ryzæna typicus*, A. Smith, *S. A. Q. Journ.* i. p. 53.  
*Ryzæna capensis*, Lesson, *Mamm.* p. 178.  
*Ryzæna tetradactyla*, Schinz, *Syn. Mamm.* i. p. 380.  
*Ryzæna suricata*, Fischer, *Syn. Mamm.* p. 167.  
*Suricate*, Buffon, *H. N.* xiii. t. 8.  
*Zenic*, Sonnerat, *Voy.* t. 92; Müller, *Cim. Phys.* t. 2.

*Hab.* South Africa (called "Meer Kat" at the Cape).

Skull short and broad, the width three-fourths the length; the brain-case broad, half the length of the skull; orbit complete behind; forehead shelving, arched; crown convex. The first upper false grinder compressed; the second subtrigonal, with a lobe on the middle of the inner side. The flesh-tooth subtrigonal, broader than long in front. The tubercular grinders transverse; the front with the inner nearly twice as broad as the outer edge; the hinder similar, but much smaller. Hinder palate-opening contracted.

## Fam. 10. CANIDÆ.

Tubercular grinders two on each side of the upper and lower jaws; false grinders 2 or 3 on each side of each jaw; molars  $\frac{5}{7}$ .  $\frac{5}{7}$  or more. Feet produced; toes 5.5, straight, free, with blunt, exposed, worn-tipped claws; the front inner toe high up, rarely wanting. The upper sectorial grinder compressed, three-lobed, with a small tubercle on the front of the inner edge. Head elongate; nose more or less produced, flat and bald, beneath with a central longitudinal groove.

*Canidæ*, Baird, *Mam. N. Amer.* p. 103, 1859; Gray, *P. Z. S.* 1868, p. 493.

The Canidæ have been separated by general consent into three natural groups, according to the length and form of the tail,—the *Wolves* having a short and straight tail, the *Dogs* a more or less elongated tail bent to the left and more or less curled, the *Foxes* an elongated bushy tail. In South America there is found a group with the skull like the *Wolves*', but with a long slender tail, which may be called long-tailed *Wolves*. The *Foxes* are generally nocturnal, and have the pupil of the eye elliptical and erect when contracted.

The form of the contracted pupil of the eye has yet to be observed in a large number of species. Mr. Bartlett, in reply to my inquiry, states that "the females of the Long-eared Fox, the Arctic, and the Common Fox have oblong erect pupils. The Black-backed and

Common Jackals have round pupils like the Wolf and Dog" (March 28, 1868).

Mr. Bryan Hodgson, in his collection of Drawings of Nepalese Animals, represents the Buansu (*Cuon*), the Jackal or Shidar (*Sacalius indicus*), the Cabul Greyhound (*Canis cabulensis*), the Tibetan Terrier, Tibetan Mastiff (with four and five claws), *Vulpes ferrilatus*, *V. indicus*, and *V. subhimachalus*, as all having round pupils; but I doubt if in the three last-mentioned this is not a mistake of the artist.

Dr. Rüppell, in his 'Atlas,' figures the Fennec and the North-African Foxes with round pupils.

The dentition of the family is generally uniform. The normal number of teeth is 42, viz. cutting-teeth  $\frac{3}{3}$ , canines  $\frac{1}{1}$ , premolars  $\frac{3}{4}$ ,  $\frac{3}{4}$ , sectorial teeth  $\frac{1}{1}$ ,  $\frac{1}{1}$ , tubercular grinders  $\frac{2}{2}$ ,  $\frac{2}{2}$ . The incisors, canines, and the last lower molar have a single fang; the second and third upper premolars and all the premolars and molars below, but the last, have two fangs. The upper sectorial or fourth premolar and the last upper true molar have three fangs, the first upper premolar four fangs. (See *De Blainville, Ostéographie*.)

Some genera of the family present certain anomalies. Thus *Icticyon* has only 38 teeth, there being only one tubercular grinder on each side of each jaw; *Cuon* has 40 teeth—that is, has two tubercular grinders on each side of the upper, and only one on each side of the lower jaw. On the other hand, *Thous* and *Megalotis* have 44 teeth—that is, two tubercular grinders on each side of the upper, and three on each side of the lower jaw. Sometimes some anomalous specimens present an excess over the usual number of teeth: thus M. de Blainville has figured a Mastiff with three tubercular grinders on each side of each jaw, the hinder small, cylindrical. (*Ann. Franç. et Etrang. d'Anat. &c.* ii. p. 313, t. 1. f. 2.)

The sectorial teeth in the upper jaw, in all the typical *Canidæ*, are compressed, three-lobed, with a small internal lobe close to the front edge. In the aberrant *Otocyon*, on the contrary, the sectorial tooth is nearly triangular, almost as wide as long, very unlike those of the other Dogs.

#### *Synopsis of the Genera.*

Section I. **LUPINÆ.** The skull thick, solid; the postorbital process thick, convex above and bent down at the tip.

Subfam. 1. **LYCAONINA.** Head short, broad; nose short, broad. Teeth large, close together. Palate very broad, short. Tail short, straight.

##### 1. **LYCAON.**

Subfam. 2. **CANINA.** Head more or less elongate; nose tapering. Teeth moderate. Palate elongate.

A. **WOLVES.** Tail short, straight, bushy. Skull elongate. Old World and America.

\* Head short; teeth 38; tubercular grinders  $\frac{1}{1}$ ,  $\frac{1}{1}$ .

2. **ICTICYON.** South America.



\*\* *Head short; teeth 40; tubercular grinders  $\frac{3}{4}$ .  $\frac{3}{4}$ .*

3. CUON. Old World—Asia.

\*\*\* *Head elongate; teeth 42; tubercular grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ . Temporal muscles separated by a narrow linear central ridge.*

4. LUPUS. Head moderate; nose broad. Upper sectorial grinder in a line with the other grinders. Europe and North America.

5. DIEBA. Head moderate; nose broad. Upper sectorial grinder placed oblique as regards the other grinders. Africa.

6. SIMENIA. Head very long; nose slender. Premolars far apart, small. Africa.

7. CHRYSOCYON. Head very long; nose slender. Premolars approximate, large. South America.

B. DOGS. *Tail elongate, bent or curled. Skull short or elongate.*

8. CANIS. Domesticated.

C. FOX-TAILED WOLVES. *Tail elongated, hairy. South America.*

\* *Teeth 42; tubercular grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ .*

9. LYCALOPEX. Pupil circular. Upper tuberculars large.

10. PSEUDALOPEX. Pupil elongate. Upper tuberculars moderate.

\*\* *Teeth 44; tubercular grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ .*

11. THOUS.

Section II. **VULPINÆ.** Skull slight, thin, elongate; nose tapering, long. Postorbital process thin, concave above, and spread out horizontally at the tip.

*Vulpina, Burmeister.*

Subfam. 3. VULPINA.

D. FOXES. *Tail elongate, bushy, with a gland covered with coloured hair on the upper part, near the base. Skull very long. Upper sectorial grinders compressed, three-lobed, with a small tubercle on the front part of the inner side; tubercular grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ . Pupil often elliptical, erect.*

12. VULPES. Ears moderate; ear-bullæ moderate.

13. FENNECUS. Ears very large; ear-bullæ large.

14. LEUCOCYON. Skull broad in front of orbits.

E. BRISTLE-TAILED FOXES. *Tail elongate, hairy, with a crest of bristles along the upper edge. Teeth like Foxes'.*

15. UROCYON.

F. RACCOON DOG. *Tail short, straight, bushy. Upper sectorial grinders compressed, three-lobed, with a small anterior internal lobe; tubercular grinders  $\frac{2}{3}$ .  $\frac{2}{3}$ .*

16. NYCTEREUTES.



The subfamilies may be thus arranged:—

- |   |   |  |
|---|---|--|
| I. Skull solid; postorbital process thick, convex above. LUPINÆ ..... | $\left\{ \begin{array}{l} 1. \text{LYCAONINA} \dots\dots\dots \\ 2. \text{CANINA} \dots\dots\dots \\ \text{Wolves} \dots\dots\dots \\ \text{Caninia (Dogs)} \dots\dots \end{array} \right.$ | $\left. \begin{array}{l} \text{Tail short, straight, bushy.} \\ \text{Tail elongate, curled to the left.} \end{array} \right\}$  |
| I. Skull thin; postorbital process thin, concave above. VULPINÆ ..... | $\left\{ \begin{array}{l} 1. \text{Foxes} \dots\dots\dots \\ 2. \text{Bristle-tailed Foxes.} \\ 3. \text{Raccoon Dog} \dots\dots \end{array} \right.$                                       | $\left. \begin{array}{l} \text{Tail elongate, straight.} \\ \text{Tail elongate, soft, bushy.} \\ \text{Tail elongate, bristly, bushy.} \\ \text{Tail short, straight, bushy.} \end{array} \right\}$ |

Section I. LUPINÆ. *Skull thick, solid; postorbital process thick, convex above, and bent down at the end.*

Lupinæ, part., *Burmeister and Spencer Baird; Gray, P. Z. S. 1868, p. 495.*

### Subfam. I. LYCAONINA.

Head short, broad; nose short, broad. Teeth large, close together. Palate very broad, short.

Lycaonina, *Gray, P. Z. S. 1868, p. 495.*

#### 1. LYCAON. (Hyæna Dog.)

Skull short, broad; nose short, broad, swollen; palate short, very broad; internal nasal opening broad. Postorbital process thick, convex above, bent down at the end. Teeth 42; false grinders  $\frac{3}{3}$  .  $\frac{3}{3}$ ; sectorial  $\frac{1}{1}$  .  $\frac{1}{1}$ ; molars  $\frac{2}{2}$  .  $\frac{2}{2}$ ; the upper and lower premolars acutely dentated on the front and, especially, on the hinder edge; upper sectorial teeth strong, elongate, trigonal, broad, with a small but well-marked interior lobe in front. First upper tubercular tooth large, with a broad rounded internal lobe; the second upper tubercular oblong transverse, much smaller; lower hinder tubercular very small, cylindrical.

Lycaon, *Brooks; Gray, P. Z. S. 1868, p. 495.*

This group is intermediate between the Hyæna and the Dog. The manner of copulation is said to be different from the Dog's, and similar to that of the Hyæna.

#### *Lycaon venaticus.* (Simir or Mebbia.)

B.M.

*Kynos pictus, Rüppell.*

*Lycaon tricolor, Brooks.*

*Lycaon typicus, A. Smith.*

*Lycaon venaticus, Gray, Cat. Mamm. B. M. p. 67; P. Z. S. 1868, p. 497; Gerrard, Cat. of Bones in B. M. p. 90.*

*Canis aureus, Thunberg, Mém. Acad. Pétersb. iii. p. 302.*

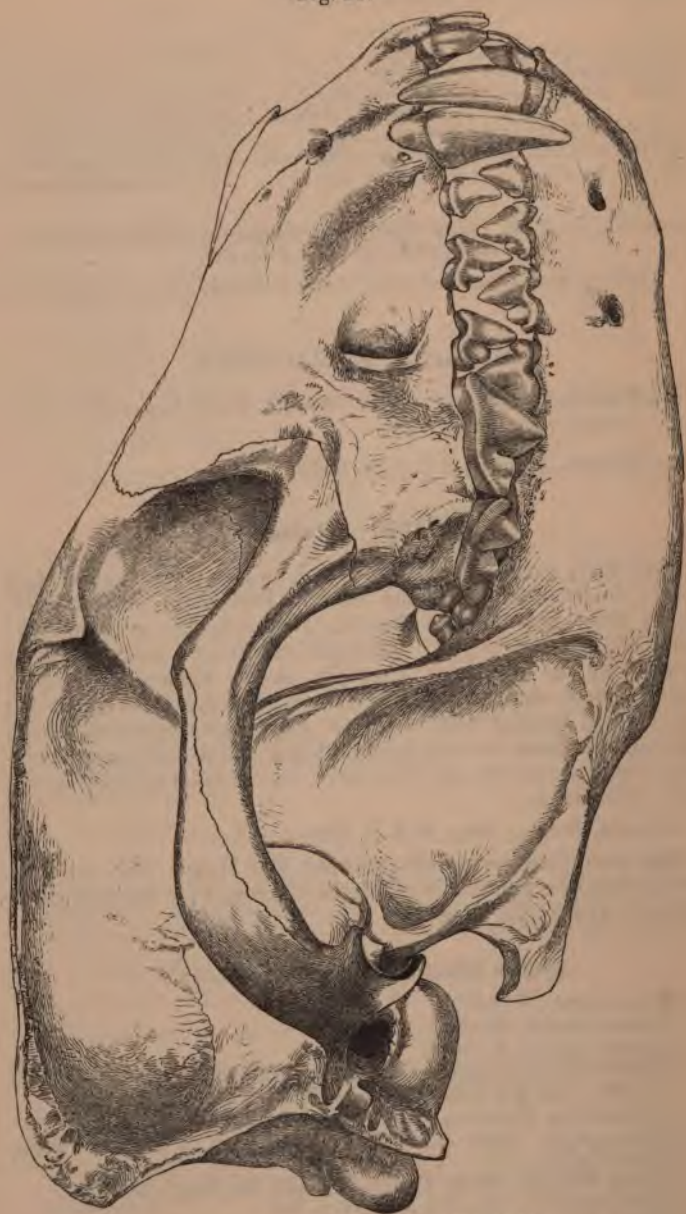
*Hyæna picta, Temm. Ann. Gén. Sci. Phys. iii. p. 54, t. 35; Kuhl, Beitr. p. 75.*

*Hyæna venatica, Burch. Travels, i. p. 456, fig., ii. pp. 222, 232.*

*Chien hyénoïde, Cuv. Oss. Foss. iv. p. 386.*

*Hyæna Dog, Griffith, A. K.*

Fig. 23.

Skull of *Lycaon venaticus*. (No. 1141.)

*Canis tricolor*, Griffith, *A. K.* v. p. 288, t.

*Canis pictus*, Desm. *Mamm. Suppl.* p. 388; *Blainv. Ostéogr.* t. 8 (skull), t. 9 (teeth).

*Var.?* *Canis pictus*, Cretsch. in Rüppell's *Atlas*, p. 35, t. 12.

*Hab.* Africa: Cape of Good Hope (*Burchell*) (called "Mebbia"); East Africa, Cordofan (*Rüppell*) (called "Simir").

## Subfam. II. CANINA.

Head more or less elongate; nose tapering. Teeth moderate. Palate elongate.

*Canina*, Gray, *P. Z. S.* 1868, p. 497.

A. WOLVES. Tail short, straight, bushy, not reaching below the heel.

\* Head short. Skull elongate. Teeth 38; tubercular grinders  $\frac{2}{2} \cdot \frac{2}{2}$ , rarely  $\frac{2}{1} \cdot \frac{2}{1}$  or  $\frac{1}{1} \cdot \frac{1}{1}$ .

## 2. ICTICYON.

Head short, broad. Teeth 38; false grinders 3.3 in each jaw; flesh-teeth large, three-lobed; upper with a small internal lobe on the front edge; the lower sharp-edged; tubercular grinders  $\frac{1}{1} \cdot \frac{1}{1}$ ; upper large, triangular, transverse; lower small, circular; false grinders  $\frac{2}{2} \cdot \frac{2}{2}$ .

*Icticyon*, Lund, 1842; *Burmeister, Fauna Bras.* ii. p. 1; Gray, *P. Z. S.* 1868, p. 497.

*Cynalycus*, Gray, *Ann. & Mag. N. H.* 1846, xvii. p. 293.

*Melictes*, Schinz, 1849.

## *Icticyon venaticus.*

B.M.

*Icticyon venaticus*, Lund, *Fauna Bras.* p. 184; *Wagner, Wieg. Arch.* 1843, p. 355; *Burmeister, Fauna Bras.* i. t. 18-20; *Gerrard, Cat. of Bones of Mamm.* p. 89; *Van der Hoeven, Kais. Ak. d. Wiss.* vii.; Gray, *P. Z. S.* 1868, p. 498.

*Cynalycus melanogaster*, Gray, *Ann. & Mag. N. H.* 1846, xvii. p. 293; *Wieg. Arch.* 1847, p. 15. (B.M.)

*Cynogale venatica*, Lund, *K. D. V. Selsk.* 1842.

*Melictis Beskii*, Schinz, *Wieg. Arch.* 1849, p. 10.

*Canis brachyotus*, *Blainv. Ostéogr.* t. 9 (skull), t. 12 (teeth).

*Hab.* Brazil.

\*\* Teeth 40; tubercular grinders  $\frac{2}{1} \cdot \frac{2}{1}$ . Temporal muscles separated by a narrow cranial ridge.

## 3. CUON.

Skull short; nasals elongate. Teeth 40; tubercular grinders  $\frac{2}{1} \cdot \frac{2}{1}$ , the lower hinder tubercular grinder deficient.—*Blainv. Ann. Franç. et Etrang. d'Anat.* i. t. 8. f. 4.



*Cuon*, *Hodgson*; *Gray*, *P. Z. S.* 1868, p. 498.

The small hinder tubercular grinders of the upper and lower jaw deficient. (See *Blainv. Ostéogr.* t. 9?)

1. *Cuon primævus*. (Buansuah.) B.M.

Skull—nose short, broad, swollen; forehead broad, convex, gradually shelving from the nose-line; nasals produced behind the hinder upper edge of the maxillaries.

*Canis primævus*, *Hodgson*, *P. Z. S.* 1833, p. 111; *Blainv. Ostéogr. Canis*, p. 49, t. 8 (skull), t. 9 (teeth); *Laur. & Bazin, Ann. d'Anat. et Phys.* i. t. 8. f. 4 (skull); *Hodgson, Trans. Asiat. Soc.*, t.; *Gray, Cat. Mamm. B. M.* p. 57; *P. Z. S.* 1868, p. 498.  
*Cuon primævus*, *Gerrard, Cat. of Bones of Mamm. B. M.* p. 81.  
*Canis himalayanus*, *Lesson*.

*Hab.* Nepal (*Hodgson*, B.M.); Cashmere (*Abbott*).

2. *Cuon alpinus*. B.M.

*Canis alpinus*, *Pallas, Zoogr. Rosso-Asiat.* i. p. 34; *Van der Hoeven, Kais. Akad. d. Wiss.* vii. t. 17 (teeth); *Gray, Cat. Mamm. B. M.* p. 57; *Schrenck, Amurland*, p. 48.  
*Cuon alpinus*, *Gray, P. Z. S.* 1868, p. 498; *Gerrard, Cat. of Bones of Mamm. B. M.* p. 81.

*Hab.* Siberia, Altai Mountains (*Brandt*) (skull, B. M.).  
 Skull very like that of the preceding species, if different.

3. *Cuon sumatrensis*. B.M.

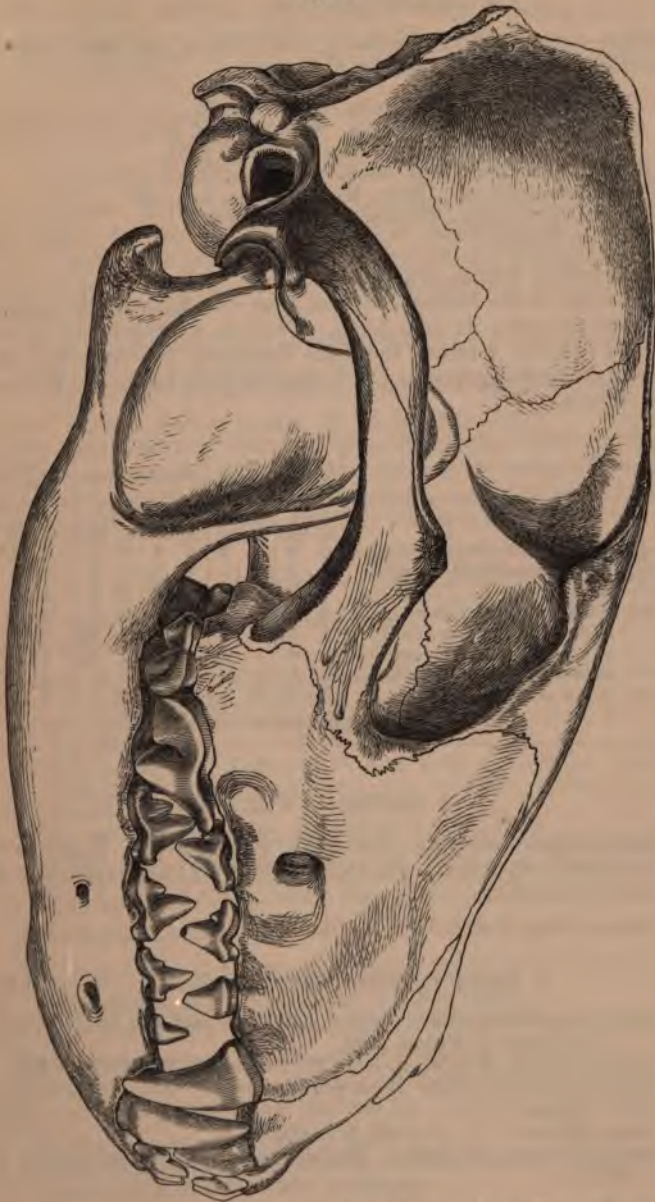
Skull—nose short, broad, swollen, slightly raised above the nose-line; nasals produced behind the hinder upper edge of the maxillaries.

*Canis* (familiaris, var.) *sumatrensis*, *Hardwicke, Linn. Trans.* xiii. p. 235, t. 25; *Raffles, Linn. Trans.* xiii. p. 249.  
*Canis sumatrensis*, *F. Cuv. Dict. d'H. N.* viii. p. 557.  
*Cuon sumatrensis*, *Gerrard, Cat. of Bones of Mamm. B. M.* p. 81; *Gray, P. Z. S.* 1868, pp. 498, 499 (skull).

*Hab.* Sumatra (B.M.); Malacca (*Carlton*, B.M.); Java (*Leschenault*, B.M.).

The skull figured by De Blainville (*Ostéogr.* t. 8) is that of a domestic Dog, perhaps from Java. The skull in the British Museum is very like that of the *Cuon alpinus*. A skeleton sent from Paris, and marked "*Canis javanicus*" (160 e), is a *Cuon*; and the skull is so like that of *Cuon sumatrensis* that I cannot discover any difference between them. I suppose this is the animal named *Canis rutilans* by Boie, and *C. hodophylax*, *C. hodophilax*, and *C. hippophylax* by Temminck in the 'Fauna Japonica,' called *Jamainu*, said to have small, erect ears, and to be of the form and size of a Wolf.

Fig. 24.



Skull of *Cuon sumatrensis*. (Sumatra, No. 160 a.)

4. *Cuon dukhunensis*. (Dhole.)

B.M.

Skull—nose slender, elongate; nasal bones the same length. Forehead much raised above the nose-line.

*Canis dukhunensis* or *Kolsum*, *Sykes*, *P. Z. S.*

*Cuon dukhunensis*, *Gray*, *Cat. Mamm. B. M.* p. 37; *P. Z. S.* 1868, p. 500; *Gerrard*, *Cat. of Bones of Mamm.* p. 81.

*Canis dhola*, *Gray*, *Griff. A. K.*

*Canis familiaris*, var., *Elliot*, *Madras Journ.* x. p. 100.

Wild Dog or Dhole, *Williamson*, *Wild Sports*.

† Dhole, *Wooler*.

*Hab.* India; Deccan (*Sykes*, B.M.).

The skull, in the British Museum, from Col. Sykes is of a young specimen changing its milk-teeth. There is a second skull in the Museum (158 b), received from the Zoological Society under the name of *Canis dukhunensis*; but it appears to be rather the skull of *C. primævus*.

	<i>C. primævus.</i>		<i>C. alpinus.</i>		<i>C. sumatrensis.</i>		<i>C. dukhunensis.</i>
	158 a.		161 a.		160 a.	160 c.	162 a.
	in.	lin.	in.	lin.	in.	lin.	in.
Length from nose to occipital condyle	6	9	7	0	6	3	6
— of nose from front of orbits ...	2	9	2	11	2	7	3
— of lower jaw .....	5	4	5	9	4	11	4
Width of brain-case, over ears .....	2	6	2	7	2	4	2
— of forehead between orbits ...	1	4	1	6	1	3	1
— of nose at preorbital foramen.	1	6	1	9	1	5½	1
— at back of zygomatic arches ...	4	1	4	3	3	8	3
Height of jaw at front of orbit .....	3	3	3	3	2	11	2
All adult but 162 a.							

4. *LUPUS*. (Wolf.)

Head moderate, elongate; nose moderate, tapering. Upper pre-molars slightly separated; the upper flesh-tooth in the same line as the other grinders.

*Lupus*, *Gray*, *P. Z. S.* 1868, p. 501.

1. *Lupus vulgaris*. (European Wolf.)

B.M.

*Canis lupus*, *Linn. Fauna Suecica*, p. 3; *Syst. Nat.* i. p. 58; *Gerrard*, *Cat. of Bones of Mamm.* p. 84.

*Lupus vulgaris*, *Brisson*, *R. A.* p. 235; *Gray*, *P. Z. S.* 1868, p. 501.

*Lupus sylvestris*, *Aldrov. Digit.* p. 173, fig

Wolf, *Pennant*.

Loup, *Buffon*, *H. N.* vii. p. 39, t. 3 (skull).

Loup d'Europe (*C. lupus*), *Blainv. Ostéogr.* t. 3 (skeleton), t. 6 (skull).

*Hab.* Europe, France (*B.M.*).



*Var. Black. Black Wolf.*

*Canis lycaon*, *Erzleben, Syst.* p. 560; *Schreber, Säuegeth.* p. 353, t. 89.

*Canis lupus niger*, *Herm. Obs. Zool.* p. 32.

Loup noir, *Buffon, H. N.* ix. p. 362, t. 41; *F. Cuv. Mamm. Lith.* t.

Black Wolf, *Shaw.*

*Hab.* Europe, Pyrenees.

2. *Lupus chanco.* (The Chanco or Golden Wolf.) B.M.

Fur fulvous, on the back longer, rigid, with intermixed black and grey hairs; the throat, chest, belly, and inside of the legs pure white. Head pale grey-brown; forehead grizzled with short black and grey hairs. Length of the body and head 42, tail 15 inches. Skull  $8\frac{1}{4}$  inches long.

*Canis chanco*, *Gray, P. Z. S.* 1863, p. 94; *Ann. & Mag. N. H.* ser. 3. xii. p. 475; *P. Z. S.* 1868, p. 501.

? *Lupus laniger*, *Hodgson, Blyth, Journ. Asiat. Soc. Beng.* 1847.

*Hab.* Chinese Tartary (*Lieut. W. P. Hodnell, B.M.*).

The skull 1422 *a* is that of a normal European Wolf and about the same size (but the nose is longer, rather more slender); and the teeth, as well as the shape of the skull, are very similar to those of that animal. Two small grinders below behind the canines.

3. *Lupus occidentalis.* (American Wolf.) B.M.

Skull—forehead convex, rounded; internal nostrils broad in front and narrow behind.

*Canis lupus griseus et albus*, *Sabine, Journ.* p. 654; *Aud. & Bachm. N. A. Quad.* iii. p. 276, 1854.

*Canis lupus occidentalis*, var. *griseus et albus*, *Richard. F. Bor.-Am.* i. p. 66, 1829.

*Canis occidentalis*, *Dekay, Z. N. Y.* i. p. 42, t. 27. f. 2; *S. Baird, Mamm. N. A.* p. 105; *Gerrard, Cat. of Bones of Mamm.* p. 84. (Skull 165 *c.*)

*Canis variabilis*, *Pr. Max. Reise N. A.* ii. p. 95, 1841.

? *Lupus gigas*, *Townsend, Journ. Acad. N. S. Phil.* ii. p. 75, 1850.

*Lupus occidentalis*, *Gray, P. Z. S.* 1868, p. 501.

*Canis lupus canadensis*, *Blainv. Ostéogr.* t. 7 (skull).

*Hab.* North America (B.M.).

Var. 1. *nubilus.* "Colour light sooty or plumbeous brown."

*Canis nubilus*, *Say, Long's Exped.* i. p. 168, 1822.

*Canis occidentalis*, var. *nubilus*, *Spencer Baird, Mamm. N. A.* p. 111.

Var. 2. *mexicanus.* "Fur varied with grey and black; neck maned more than usual; a black or dusky band encircling the muzzle; a dusky slope down the fore leg."—*Baird.*

*Canis mexicanus*, *Linn. S. N.* i. p. 60.

*Canis occidentalis*, var. *mexicanus*, *S. Baird, Mamm. N. A.* p. 113.

Xoloit cuintli, *Hernand. Mex.* p. 479, fig.

*Lupus mexicanus*, *Brisson, R. A.* p. 237.

Loup de Mexique, *Buffon*, *N. H.* xv. p. 149.

Mexican Wolf, *Penn.*

Cuetlachti, *Fernand. N. Hisp.* p. 7.

*Hab.* Mexico (*Hernand.*); Santa Cruz; Sonora.

Var. 3. *ater*. Black Wolf.

B.M.

Forehead of skull concave in the central line; internal nostrils narrow, parallel.

*Canis lycaon*, *Harlan, Fauna Amer.* p. 126, 1828.

*Canis lupus ater*, *Rich. F. Bor.-Am.* i. p. 70; *Aud. & Bachm. N. A.*

*Quad.* p. 126, t. f. 7, 1851.

*Canis occidentalis*, var. *ater*, *S. Baird, Mamm. N. A.* p. 113. (Skull 165 c, B.M.)

*Hab.* Florida; Georgia.

Var. 4. *rufus*.

Mixed red and black above, lighter beneath.

*Canis lupus*, var. *rufus*, *Aud. & Bachm. N. A. Quad.* ii. p. 240, t. 82, 1851.

*Canis occidentalis*, var. *rufus*, *S. Baird, Mamm. N. A.* p. 113.

*Hab.* Texas.

#### 4. *Lupus aureus*. (Jackal.)

B.M.

Skull—nose sloping on the sides, broad in front of orbits. The sectorial tooth is placed obliquely in respect to the line of the premolars and tubercular grinders.

*Canis aureus*, *Linn. S. N.* i. p. 59; *Pallas, Zoogr. Rosso-Asiat.* i. p. 39, t. 3; *Gray, Cat. Mamm. B.M.* p. 58; *F. Cuv. Mamm. Lith.* t.; *Blainv. Ostéogr.* t. 4 (skull, var. *barbarus*), t. 6 (var. *mareoticus*, skull rather wider).

*Canis barbarus*, *Shaw, Zool.* i. p. 54.

Barbary Jackal, *Pennant, Quad.* i. p. 260.

*Lupus aureus*, *Kampf. Amœn. Exot.* p. 413, t. 407. f. 3; *Gray, P. Z. S.* 1868, p. 504.

*Canis micrurus*, *Reichenbach.*

*Thos, Pliny.*

Chacal adivé, *Buffon, H. N.* xiii. p. 255, *Supp.* iii. t. 16.

Schakall, *S. G. Gmelin, Reise*, iii. p. 80, t. 13; *Güldenst. in Nov.*

*Com. Petrop.* xx. p. 449, t. 10.

Jackal, *Penn., Shaw.*

*Hab.* India; Ceylon (*Reid*).

The several skulls in the British Museum differ from each other. 163 c is very wide at the zygomatic arches. Length 5 inches 4 lines, width 3 inches 3 lines. The aperture of the internal nostril is wide, 8 lines, much wider than in other skulls. The skull of a Jackal from Barbary, sent to the Zoological Gardens by E. W. Drummond Esq., 163 d:—length 5 inches 1 line, width 3 inches 1 line; aperture of internal nostril 6 lines.

163 c. Nepal. Presented by B. Hodgson, Esq.

A skeleton with skull in the British Museum, 163 k (*Canis aureus*, part., Gerrard), from the Zoological Gardens is peculiar. Length

5 inches 4 lines, width 2 inches 2 lines, internal nostril 5 lines. The skull like that of *Lupus aureus*; but the coronal ridge is rather dilated or vase-shaped in the middle of the length, and the upper hinder tubercular grinders rather larger in comparison with the other grinders. They are perhaps different species.

5. *Lupus pallipes*. (The Landgak.)

B.M.

Coronal crest linear, high; upper sectorial teeth large, elongate.

*Canis pallipes*, Sykes, *P. Z. S.* 1831, p. 101; Gray, *List Mamm. B. M.* p. 58; Gerrard, *Cat. of Bones of Mamm.* p. 82.

*Canis lupus*, Hodgson; Elliot, *Madras Journ.* x. p. 101.

*Saccalius indicus*, Hodgson, *MS.*

*Lupus pallipes*, Gray, *P. Z. S.* 1868, p. 504.

*Hab.* Nepaul (Hodgson); India (Oldham, 163 e).

5. DIEBA.

Head moderate, elongate; nose rather elongate. Upper pre-molars slightly separated; the upper flesh-tooth prominent in the tooth-line and placed obliquely to the other teeth. Tail straight to the hocks.

*Dieba anthus*. (Dieb.)

B.M.

Skull (816 e)—forehead flattish, rather concave; pterygoid bones converging behind. Sectorial teeth prominent in the tooth-line and placed obliquely to the other teeth. Internal nostril narrow, sides parallel.

*Canis anthus*, F. Cuvier, *Mamm. Lithogr.* xxii. t.; Rüppell, *Zool. Atlas*, p. 44, t. 17; Gray, *Cat. Mamm. B. M.*; Gerrard, *Cat. of Bones of Mamm.* p. 85.

*Lupus anthus*, Gray, *P. Z. S.* 1868, p. 502, f. 3 (skull).

*Hab.* West Africa, Senegal (F. Cuvier); Algiers; Tunis (Frazer); North Africa; Egypt; Nubia (Rüppell, Christie).

*Var.* Head narrow. Skull (816 a) very like that of *D. anthus* (816 e), from the Zoological Gardens. The forehead and face very much narrower compared with its length; the whole length of the face, from the end of the palate to the front teeth and the canines, is smaller.

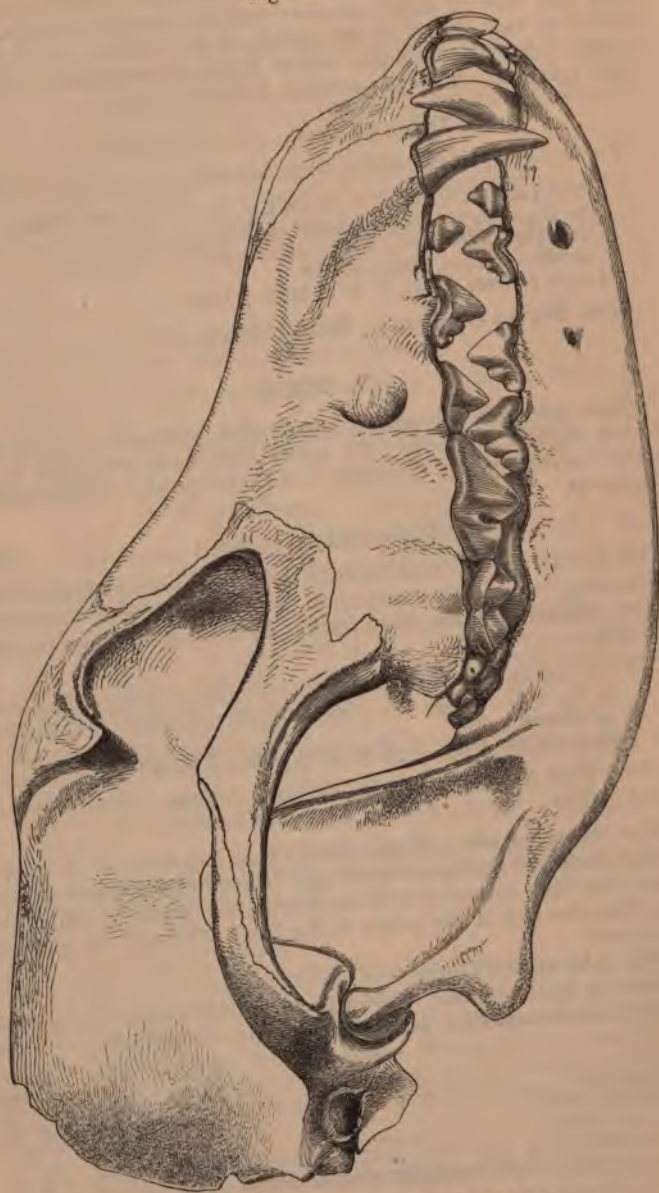
*Hab.* Algiers and Tunis.

There is another skull, 816 b (fig. 25, p. 190), from Tunis, that is somewhat intermediate in width; it wants the occiput.

	816 c.	816 b.	816 a.
	in. lin.	in. lin.	in. lin.
Length of skull .....	6 7	6 5?	6 2
Width at zygomata .....	4 2	3 9	3 6
—— at foramen .....	—	—	—
—— before orbits .....	1 6	1 5	1 3
—— of palate at outer hinder edge of sectorial teeth	2 5	2 1	2 1

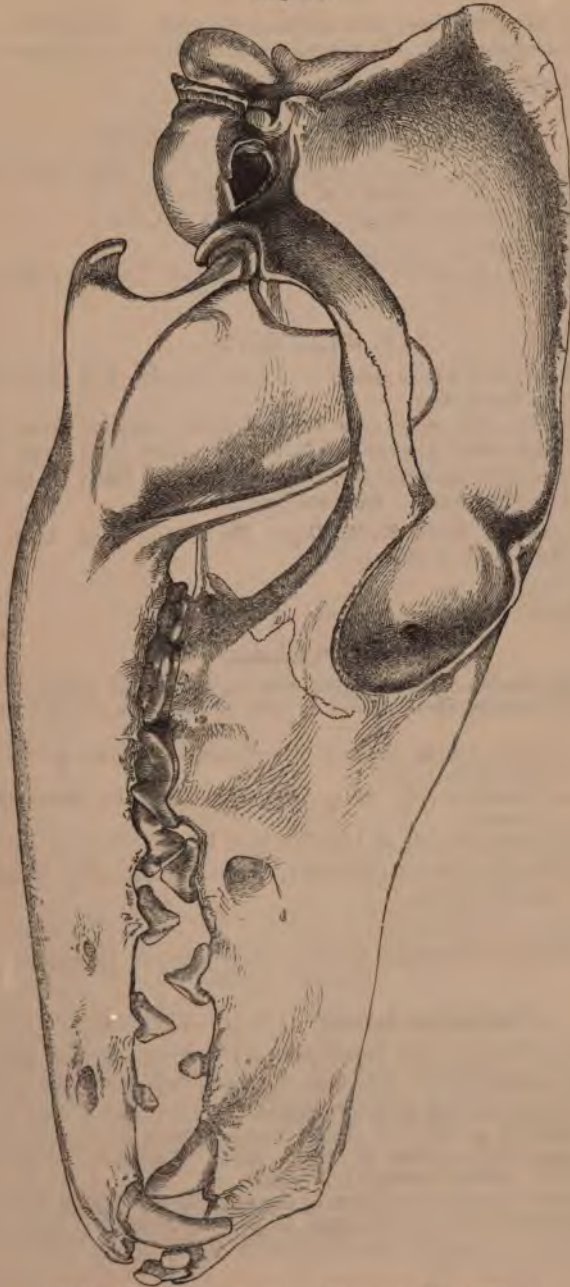


Fig. 25.



Skull of *Dieba anthus*. (Tunis, No. 816 b.)

Fig. 26.



Skull of *Simenia simensis*. (Abyssinia, No. 162 a.)

## 6. SIMENIA.

B.M.

Head elongate; nose very slender, elongate. Skull with a very slender elongate nose; the premolars small and very far apart.

*Simenia*, Gray, *P. Z. S.* 1868, p. 506.

*Simenia simensis*. (Abyssinian Wolf.)

B.M.

*Canis simensis*, Rüppell, *Abyss. Fauna*, t. 14; Gray, *Cat. Mamm. B. M.* p. 58; Gerrard, *Cat. of Bones Mamm.* p. 82.

*Simenia simensis*, Gray, *P. Z. S.* 1868, p. 506, f. 4.

*Hab.* Abyssinia (Rüppell, type in B.M.).

Skull 162*a* (fig. 26). Length 7 inches 9 lines. Coronal ridge linear.

## 7. CHRYSOCYON.

Head very long; nose slender. Pupils round. Tail short, reaching only to the hocks.

Skull elongate; nose very long, slender; coronal crest single, linear; postorbital process thick, convex above, bent down at the tip. Premolars approximate, large. Sectorial tooth in the same line as the other teeth. Internal palate narrow.

*Chrysocyon*, *Ham. Smith, Dogs*; *Burmeister, Faun. Bras.* p. 24; Gray, *P. Z. S.* 1868, p. 506.

\* *Upper sectorial tooth moderate.* *Chrysocyon*.—Gray, *l. c.* p. 506.

1. *Chrysocyon jubata*. (Guara.)

B.M.

*Canis mexicanus*, *Sonn. Nouv. Dict.* vi. p. 505 (not *Linn.*).

*Canis jubatus*, *Desm. Mamm.* p. 198; *Burm. Faun. Brasil.* t. 21, t. 26, f. 1.

*Chrysocyon jubata*, *Gerrard, Cat. of Bones of Mamm.* p. 89; Gray, *P. Z. S.* 1868, p. 506.

*Canis campestris*, *Pr. Max. Beitr.* ii. p. 334, n. 1; *Blainv. Ostéogr.* t. 7 (skull).

*Loup rouge*, *Cuv. R. A.* i. p. 154, iv. t. 1.

*Hab.* South America (solitary); Paraguay (*Azara*); Brazil (*Pr. Max.*); Buenos Ayres.

\*\* *Upper sectorial tooth transverse, very large.* *Neocyon*.—Gray, *l. c.* p. 506.

2. *Chrysocyon latrans*. (Prairie-Wolf. Coyote.)

B.M.

Skull 171*a* very like *Lupus anthus*; but nose longer and more slender. Muzzle short, like that of a Fox; tail short, like a Wolf's.

*Canis latrans*, *Say, in Long's Exped.* i. p. 168; *Aud. & Bachm. N. A. Quad.* ii. p. 150, t. 71, 1829; *Baird, Mamm. N. A.* p. 113; *Gerrard, Cat. of Bones of Mamm.* p. 85; Gray, *Cat. Mamm. B. M.* p. 58; *Blainv. Ostéogr.* t. 7 (skull).

*Vulpes velox*, *Gerrard, Cat. of Bones of Mamm.* n. 1237*a*.

*Chrysocyon* (*Neocyon*) *latrans*, Gray, *P. Z. S.* 1868, p. 506.



*Var. Small.*

*Canis frustror*, *Woodhouse, Proc. Ac. N. S. Philad.* iv. p. 147 (1850), v. p. 157 (1851).

Small Wolves, *Dupretz*.

Burrowing Dog, *Levis & Clark*.

Cased Wolves, *Furrier's List*.

*Lyciscus cagotis*, *Ham. Smith, Nat. Lib. Dogs*.

? *Canis ochropus*, *Eschsch. Zool. Atlas*, i. t. 11; *Gray, List. Mamm. B. M.* p. 59; *Zool. Sulph.* p. 32, t. 10.

*Hab.* North America (in packs): Upper Missouri (*Long*); California (*B.M.*).

"Replaces the Jackal of the Old World. Brings forth its young in a burrow. Barks like a Domestic Dog."—*S. Baird*.

Skulls 171 *a, b, c*. Width at zygomata 3 inches 4 lines; length of palate 3 inches 5 lines, of the upper jaw at the hinder edge of the sectorial tooth 2 inches, at the base of the canines 1 inch 1 line.

1237 *a*. "*Vulpes velox*, *Rich.*"

Skull 171 *c*. Length 7 inches; width at zygomata 3 inches 10 lines, at preorbital foramen 1 inch 3 lines, at outer hinder end of the sectorial tooth 2 inches 1 line, of the upper jaw at the base of the canines 1 inch 1 line; length of palate 3 inches 9 lines.

*B. Dogs.* Tail elongate, curved or curled; temporal muscle only separated by a line or coronal ridge.—*Gray, P. Z. S.* 1868, p. 508.

## 8. CANIS. (Dog.)

Head moderate or elongate. Ears often dependent or recurved. The small hinder tubercular grinder of the upper and lower jaws well developed.

*Canis, Gray, P. Z. S.* 1868, p. 508.

1. *Canis familiaris*. (Dog.)

B.M.

*Canis familiaris*, *Linn. S. N.* i. p. 56; *Gray, Cat. Mamm. B. M.* p. 57; *P. Z. S.* 1868, p. 508; *Gerrard, Cat. of Bones of Mamm.* p. 82.

*Canis domesticus*, *Linn. Mus. Adolph. Frid.* i. p. 6.

*Canis familiaris Terræ Novæ*, *Blainv. Ostéogr. Canis*, t. 8 (skull).

Chien, *Buffon, H. N.* v. p. 300, t. 15.

Chien domestique, *Cuv. R. A.* i. p. 152.

Dog, *Penn.*

Common Dog, *Shaw*.

*Hab.* The World where inhabited by man.

Skull 166 *f*. Bhotia Dog (black and tan). Nepaul (*Hodgson*). Length 8 inches 2 lines. Very like the skull of the Wolf of Europe.

B.M.

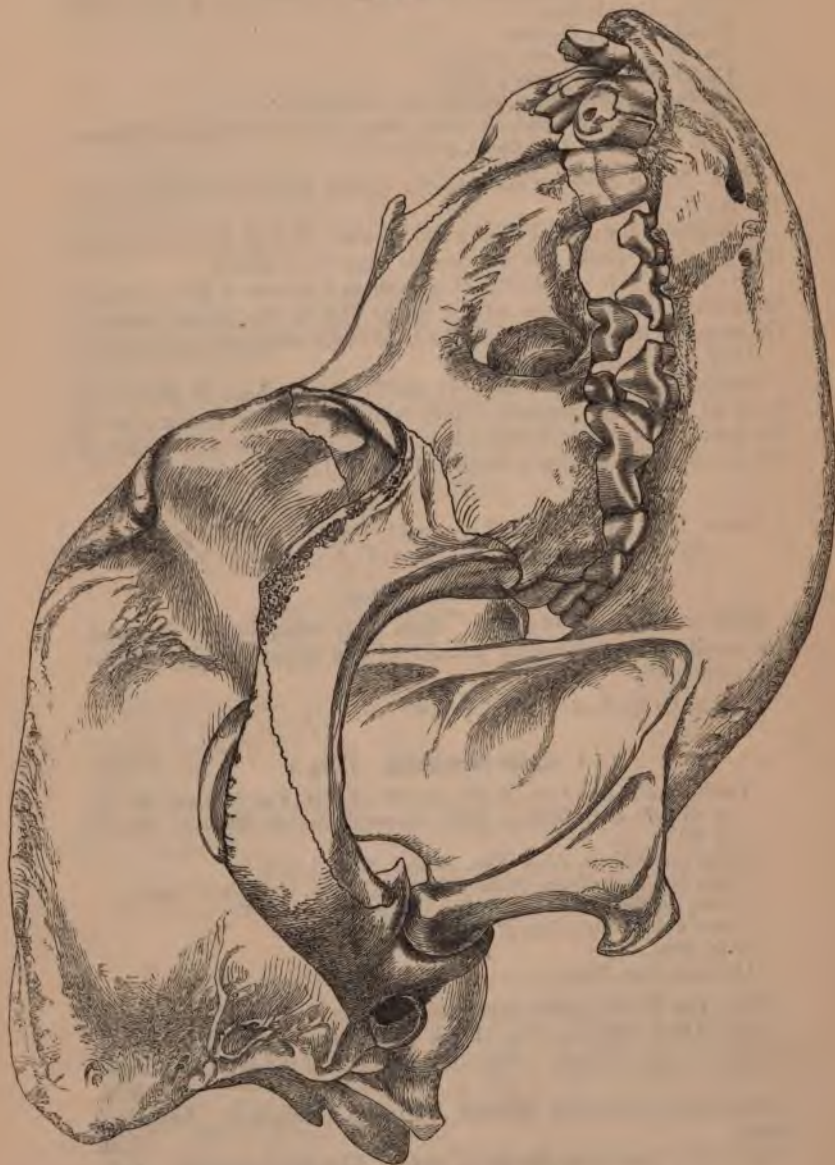
Skull 166 *b*. Tibetan Mastiff. Nepaul (*Hodgson*). Length 9 inches.

B.M.

Skull 166. Bull-Dog (fig. 27, p. 194). Utrecht Collection. B.M.

*Var. 1. Canis familiaris nepalensis*, *Blainv. Ostéogr.* t. 7 (teeth).

Fig. 27.



Skull of Bull-Dog. (No. 166.)

Var. 2. *Canis familiaris japonicus*, Temm. Fauna Japon. t. 10. f. 5, 6 (skull); Gerrard, Cat. of Bones of Mamm. p. 84.

Var. 3. *Canis familiaris chinensis*, Gray, P. Z. S. 1868, f. (skull).  
B.M.

Var. 4. *Canis familiaris Novæ Hiberniæ*, Fischer, Syn. p. 186 (called "Poull").

Var. 5. *Native Dog of New Zealand*. Fur rather long, black- and white-varied.  
B.M.

## 2. *Canis ceylanicus*.

Chien sauvage indien, *Vossmer, Descript.* 1775, t.

*Canis ceylanicus*, *Shaw, Zool. i.* p. 312; *Gray, P. Z. S.* 1868, p. 509.  
Ceylon Dog, *Penn.*

*Hab.* Ceylon.

## 3. *Canis tetradactyla*.

Chien sauvage de Cayenne, *Actes de la Soc. d'H. N. de Paris*, i. p. 115; *Meyer, Zool. Am. i.* p. 134.

? *Canis familiaris cayanensis*, *Blainv. Ostéogr. t.* 7\* (skull).

*Canis tetradactyla*, *Fischer, Syn.* p. 292; *Gray, P. Z. S.* 1868, p. 509.

*Hab.* Cayenne.

## 4. *Canis dingo*.

Ears erect. Tail elongate. Tubercular grinders  $\frac{3}{2}$ .—*Blainville*.

*Canis dingo*, *Blumenb. Handb.* p. 103; *Gray, List of Mamm. B. M.* p. 57; *P. Z. S.* 1868, p. 509; *Gerrard, Cat. of Bones of Mamm.* p. 84.

*Canis familiaris Australasiæ*, *Desm. Mamm.* p. 190; *Blainv. Ostéogr.* t. 8 (skull).

Dingo or Australasian Dog, *Shaw, Gen. Zool. i.* p. 277, f. 76.

*Hab.* Australia.

Var. *sumatrensis*. Skull short; face short, broad. Tubercular grinders  $\frac{3}{2}$ , well developed.—*Gray, l. c.* p. 509.

*Canis familiaris sumatrensis*, *Hardw. Linn. Trans.* xiii. p. 235, t. 23.

*Canis sumatrensis*, *Fischer, Syn. Mamm.* p. 186.

*Hab.* Sumatra.

The Domestic Dog has been bred into various well-marked varieties, some of which have existed from the earliest historical period, and are to be found everywhere the companions of man. New varieties are very rarely if ever produced; and some of the old or well-known varieties have a great tendency to die out, at least for a time. Indeed all varieties are only to be retained by careful breeding and weeding—that is, by the destruction, or at least exclusion from breeding, of the examples that do not come up to the standard. If this is not done, they soon deteriorate into the common Cur or the Pariah Dog of India.

Most varieties occur of very different sizes—from very large to large, middle-sized, small, or very small.

The varieties always present the same general external appearance, and often have a peculiar colour. For example, the Poodles always



have curly hair. Other varieties occur with either long or short smooth hair, with bristling or rough hair, curly hair, or with a nearly naked skin; the latter generally also have imperfect teeth, or teeth that early decay or drop out.

1. Straight-haired ..	Greyhound .....	Black - and - tan Terrier.	Spaniel.
Large-sized ....	Deerhound.		
Small-sized ....	Italian Greyhound	Toy Terrier.	
2. Soft silky hair...	Thibet Greyhound .....		Spaniel.
3. Soft curly hair ..	.....		Poodle.
4. Harsh wiry hair ..	Irish Greyhound..	Wiry or rough-haired Terrier.	
5. Naked or nearly so.	Naked Greyhound	Naked Terrier..	Naked Spaniel.
6. Short - legged or Turnspit.	.....	Turnspit Dog ..	Turnspit Dog.
7. Bull-head with imperfect upper jaw.	.....	Scotch Terrier.	
		Bull-Dog.....	King Charles Spaniel.
		Bull-Terrier.	
8. Small variety ....	.....	Pug-Dog.....	Japan Sleeve-Dog &c.
9. Large-eyed Dog ..	.....	Toy Terrier....	Japan Sleeve-Dog.

Some varieties are malformations, as (1) the Bull-Dog and the Pug Dog have a short, imperfect upper jaw and a broken nose; but this malformation occurs as a subvariety among Spaniels, as in the Japanese Sleeve-Dog; and (2) other Dogs (continued by breeding) have the lips, on the sides of the mouth, very large and pendulous, as the Mastiff. Several varieties also occur presenting (3) short-legged long-bodied breeds,—as the Turnspit, the Scotch Terrier, and the Muff-Dogs or Short-legged Spaniels. There is another variety (4) with very large, protruding eyes, which, in some of the Dogs of Japan, where this breed is esteemed, are sometimes so large and prominent as to be easily knocked out of the orbit by accident.

The Domestic Dog presents three distinct forms of ears. (1) Some, as the Spitz Dog, have short ovate, erect, hairy ears; (2) others, like the Greyhound, have elongated ears that are folded together, bent backward on the sides of the head; while (3) the Hound and Spaniels have broad ears bent down on the sides of the head. When the varieties with different forms of ears are bred together, intermediate forms may be observed.

The tail, in most varieties, is elongated, tapering and generally white at the end; it is often more or less curved, and sometimes closely spirally bent. But the tails of many Domestic Dogs are cut; and some few breeds are said to be born tailless. But I have never seen any examples of the latter.

Varieties which are very distinct in their external form, length and kind of hair, and colour, have skulls so alike that they are not to be distinguished by any appreciable character. Thus it is impossible to distinguish the skull of a Terrier from that of a Spaniel,

or either of these from that of the Pariah Dog of India, or the "Mongrel Cur" as it is called in England.

Some of the figured and named varieties, as the Lion-Dog (*Chien-lion*, Buffon, v. t. 40. f. 2; *Canis familiaris leoninus*, Gmelin), are described from Dogs that had been artificially trimmed; and of some, as the Prick-Eared Dog, the ears had been artificially clipped; and the same is the case with some of the short-tailed Dogs.

If the varieties of Dog are stumblingblocks to the systematic zoologist, which some say they are (for what reason I cannot conceive), they are never mistaken by their wild allies. It is true that a Wolf will breed with a female Dog, but so will a wild Pheasant with a domestic hen. The system of improving the breed of domestic animals by breeding and weeding seems to have been coexistent with human civilization; and to keep up the good breeds it is as necessary to be carefully attended to now as in the earliest period, showing that the varieties produced have no tendency to become perpetual.

The varieties of the Dog, like the varieties of Oxen, Sheep, Pigs, Poultry, and Pigeons, are limited; and the limits seem to have been early discovered, as most, if not all, of the varieties now existing seem to have been known in the earliest historical period, and even anterior to it.

How any one can think that the differences between varieties of domestic animals are such as zoologists would use to distinguish genera and species, is a mystery that I cannot understand; and the theory that the variation produced by breeding and weeding, or selection as it is called, is to be regarded as the origin of the difference between natural species, is more astonishing, and can only have arisen for want of careful study of the subject. There are some minds so constituted, even among the well educated, who believe in animal magnetism, metallic tactors, table-turning, phrenology, spiritualism, mesmerism, the great pyramid, natural selection, and mimicry of animals—and some even two or more of these theories in succession, or at the same time.

I do not know of any work giving a systematic or scientific description of the varieties of Dogs. Professor Fitzinger, in the 'Transactions of the Vienna Academy,' has written a long paper on the history of the different varieties and breeds, similar to the paper on the breeds of Sheep.

- C. FOX-TAILED WOLVES. *Tail elongate, reaching below the heels, more or less curved, and covered with more or less elongated hair not forming a full brush.* South America.

Fox-tailed Wolves, *Gray, P. Z. S.* 1868, p. 511.

#### 9. LYCALOPEX.

Pupil circular. Tail reaching below the hocks. The upper tubercular teeth oblong, taken together much longer than the flesh-tooth. South-American.



*Cerdocyon*, *Ham. Smith, Dogs*, p. 289, 1839.

*Lycalopex*, *Burmeister, Fauna Brasil.* pp. 24, 31; *Gray, P. Z. S.* 1868, p. 511.

### 1. *Lycalopex vetulus*.

B.M.

Tail very long, bushy; underside pale yellow. Snout reddish brown. Coronal ridge narrow linear.

*Canis vetulus*, *Sund. Bras.* p. 21, t. 40.

*Canis Azaræ*, *Pr. Wied, Abild.* t.

*Canis (Lycalopex) vetulus*, *Burmeister, Faun. Bras.* p. 37, t. 23, t. 28. f. 1, t. 29. f. 1.

*Lycalopex vetulus*, *Gray, P. Z. S.* 1868, p. 511.

*Hab.* Brazil.

### 2. *Lycalopex fulvicaudus*.

B.M.

Underside of tail reddish yellow. Temporal muscles separated by a well-marked narrow lanceolate crown, which is linear for one-fourth of its length behind (see *Burm.* t. 28. f. 2). The upper sectorial tooth short, broad, thick; upper tubercular teeth large, nearly similar in size and form.

*Canis fulvicaudatus*, *Sund. Bras.* p. 20.

*Canis (Lycalopex) fulvicaudus*, *Burm. Faun. Bras.* p. 40, t. 24, t. 28. f. 2, t. 29. f. 2.

*Lycalopex fulvicaudus*, *Gray, P. Z. S.* 1868, p. 511.

*Hab.* South America.

Skull 820 *a* is very like those figured by *Burmeister*, t. 28. f. 2, t. 29. f. 2; but the lower edge of the lower jaw is not so much arched.

Skulls 821 *a* and *b* both differ from 820 *a* in the upper sectorial and the tubercular grinders being smaller than they are in that skull. In 820 *a* the upper sectorial tooth is thick, nearly triangular, broad, and with a well-marked lobe on the front of the inner edge. In 821 *a* it is nearly of the same form—if anything, rather more equilaterally triangular; but it is smaller than in 820 *a*.

	in. lin.	
Skull 820 <i>a</i> .....	4	3 long.
Skull 821 <i>a</i> .....	4	0 „

It is evident that the teeth of these Dogs vary in size in the same species.

Var. 1. *chiloensis*, *Gray, P. Z. S.* 1868, p. 511.

B.M.

Upper sectorial tooth compressed, with inner front lobe rather in front of the front edge of the tooth; crown of skull flat, narrow, sub-vaseshaped. Hinder opening of the palate broad, expanded. Skull 821 *b*, 4 inches 2 lines long.

*Vulpes Azaræ (Chiloe)*, *Waterhouse, MS.*

*Vulpes vetulus* (partly), *Gerrard, Cat. Bones of Mamm.* (821 *b*).

*Hab.* Chiloe.



## 10. PSEUDALOPEX.

Tail elongate, reaching below the hocks. Pupil elliptical in the daylight. Skull with a linear coronal ridge; the upper tubercular teeth taken together scarcely so long as, or very little longer than the flesh-tooth.

*Pseudalopex*, *Burmeister, Faun. Bras.* pp. 24, 44; *Gray, P. Z. S.* 1868, p. 512.

\* *The fore legs grey externally; soles of the feet blackish brown.*

1. *Pseudalopex Azaræ*. (*Agoua rachay*.) B.M.

Tubercular grinders 3; front always largest.

*Canis Azaræ, Pr. Max. Beitr.* ii. p. 338; *Abbild. t.*; *Darwin, Zool. Beagle*, xiv. t. 7; *Blainv. Ostéogr.* t. 4 (skull).

*Canis brasiliensis, Schinz, Cuv. Thierr.* i. p. 222.

*Vulpes Azaræ, Gray, Cat. Mamm. B. M.* p. 60; *Gerrard, Cat. of Bones of Mamm.* p. 87.

*Agoua rachay, Azara*, i. p. 317.

*Canis melanostomus, Wagner, Wieg. Arch.* 1843, i. p. 358.

*Canis (Pseudalopex) Azaræ, Burm. Faun. Bras.* pp. 24, 44, t. 28. f. 3, t. 29. f. 3.

*Pseudalopex Azaræ, Gray, P. Z. S.* 1868, p. 512.

*Canis Azaræ, Van der Hoeven*, t. 1. f. 8.

*Hab.* South America: Brazil (*Pr. Max.*); Paraguay (*Azara*); Patagonia (*Darwin*).

\*\* *The fore legs entirely red-yellow; soles of the feet red-brown.*

2. *Pseudalopex griseus*. B.M.

Fur reddish-yellow-grey; legs red-yellow. Size small.

*Canis griseus, Gray, P. Z. S.* iv. pp. 88, 123, t. 6; *Mag. N. H.* 1837, p. 578.

*Vulpes griseus, Gerrard, Cat. of Bones of Mamm.* p. 88.

*Canis (Pseudalopex) griseus, Burmeister, Faun. Bras.* pp. 28, 48, t. 25.

*Pseudalopex griseus, Gray, P. Z. S.* 1868, p. 512.

*Hab.* Patagonia (*King*).

3. *Pseudalopex magellanicus*. (*Colpeo*.) B.M.

Fur fox-red; back blackish. Large-sized.

*Canis magellanicus, Gray, P. Z. S.* 1836, p. 88; *Mag. N. H.* 1837, p. 578; *Darwin, Zool. Beagle*, x. t. 5; *Burmeister, Faun. Bras.* t. 6. f. 3.

*Canis (Pseudalopex) magellanicus, Burm. Faun. Bras.* pp. 24, 51; *Reise La Plata*, ii. p. 405; *Wieg. Arch.* 1862, p. 329.

*Pseudalopex magellanicus, Gray, P. Z. S.* 1868, p. 512.

*Canis cancrivorus americanus, Burmeister, Fauna Bras.* t. 27 (skull).

*Vulpes magellanicus, Gray, Mag. N. H.* 1836, p. 578; *List Mamm. B. M.* p. 61; *Gerrard, Cat. Bones of Mamm.* p. 87.

? *Canis Azaræ, Waterhouse.*

? *Colpeo, Canis colpaeus, Molina.*

‡ *Canis tetradactyla*, Meyer.  
Chile Fox, Shaw, Zool. p. 329.

*Hab.* Chili and Bolivia (*Bridges*); Strait of Magellan (*Darwin*).

In the British Museum there are skulls from Chili, marked 184 *a*, 184 *c*, and 184 *f*, *Vulpes magellanicus*, which are those of adult animals, and have a linear crest extending the whole length of the crown.

There is another skull, evidently from the same series, no. 184 *e*, also without any skin belonging to it, which has its adult teeth, but is not so large or aged as the others. It has a broad flat crown (separating the temporal muscles), which is wide in front and tapering to the occiput; and the side margins are rather curved in, giving it a slightly vase-like form. Length 5 inches 7 lines, width 2 inches 11 lines.

There are also a skull and skeleton (no. 184 *b*) from Chili, of which the skull is intermediate in size between the larger skulls and the small one. The coronal crest is linear; but there is an indication of the vase-shaped crown-plate on each side of the central ridge.

Nos. 817 *a*, *b*, *c*, *d*, *e* are five smaller skulls, named *Vulpes Azaræ*, sent from Bolivia by Mr. Bridges. They are very similar externally, but they vary considerably in the size of the upper tubercular grinders as compared with the other teeth, and slightly in the form of the lobes of the upper sectorial tooth. The hinder upper tubercular is always of the same form as the penultimate, but smaller. The internal lobe of the sectorial tooth of *V. magellanicus* from Chili, 184 *e*, is rather larger, with the front edge on a level with the front edge of the body of the tooth; in the small skulls from Bolivia the lobe is very slightly in front of the line of the fore edge of the tooth.

I believe these all belong to one species; and they are very like the skulls figured as *Canis crancrivorus*, var. *brasiliensis*, by Burmeister, Fauna Bras. t. 27. They are very different in the form of the crown and other details from the skull figured as *C. Azaræ* by Blainville, Ostéogr. t. 4, and by Burmeister, Fauna Bras. t. 28, f. 4.

#### 4. *Pseudalopex antarcticus*.

B.M.

*Canis antarcticus*, Shaw, Zool. i. p. 331; *Desm. Mamm.* p. 199; *Gray, List Mamm. B. M.* p. 59; *Darwin, Zool. Beagle*, ii. t. 4.  
*Antarctic Fox*, Penn.

*Pseudalopex antarcticus*, Gray, *P. Z. S.* 1868, p. 513.

*Hab.* Falkland Islands.

#### 5. *Pseudalopex gracilis*.

*Canis (Pseudalopex) gracilis*, *Burm. Reise La Plata*, ii. p. 406;  
*Arch. Naturg.* 1862, p. 130.

*Pseudalopex gracilis*, Gray, *P. Z. S.* 1868, p. 513.

*Hab.* Pampas of Mendoza.



## 11. THOUS.

Skull elongate; nose tapering, moderate. Temporal muscles separated by a vase-shaped crown. Teeth  $44 = \frac{20}{44}$ ; two tubercular grinders in each side of the upper, and three in each side of the lower jaw, the two hinder circular, the hindmost very minute.

Lycalopex, § 1, *Burmeister*.

Thous, *Gray, P. Z. S.* 1868, p. 514.

There are three skulls in the British Museum, all showing the additional hinder lower grinders. One, 1033 *b*, has a group of four small hinder tubercular grinders on one side of the lower jaw, which displaces and throws out of the regular line the larger penultimate tubercular lower grinder.

## 1. Thous crancrivorus. (Crab-eating Dog.) B.M.

Tail moderately long. Snout blackish.

*Canis cancrivorus*, *Desm. Mamm.* p. 199; *Blainv. Ostéogr.* t. 9 (skull), t. 12 (teeth), t.

*Viverra cancrivora*, *Meyer, Zool. Ann.* i. p. 135; *Actes de la Soc. d'H. N. à Paris*, i. p. 115.

*Canis brasiliensis*, *Lund, Bras.* 1842, t.

*Canis melampus*, *Wagner*.

*Vulpes brasiliensis*, *Gerrard, Cat. of Bones of Mamm.* p. 88.

*Canis (Lycalopex) cancrivorus*, *Burm. Fauna Bras.* p. 24, t. 22, t. 27. f. 1, 4.

*Thous crancrivorus*, *Gray, P. Z. S.* 1868, p. 514.

*Lycalopex cancrivorus*, *Gerrard, Cat. of Bones of Mamm.* p. 89.

*Chien des bois*, *Buffon, H. N. Supp.* vii. p. 146, t. 38.

*Chien sauvage*, *Fermin in Holl. Équin.* p. 10.

? *Canis thous*, *Linn. S. N.* i. p. 60.

Surinam Dog, *Penn.*

*Hab.* French Guiana, in small packs.

## 2. Thous fulvipes. B.M.

*Canis fulvipes*, *Martin, P. Z. S.* 1837, p. 11; *Waterhouse, Zool. Beagle*, t. 6 (1839) (type in B.M.).

*Vulpes fulvipes*, *Gerrard, Cat. of Bones of Mamm.* p. 88.

? *Canis (Lycalopex) enterianus*, *Burmeister, Uebersicht der Säugeth. von La Plata*, ii. p. 400, 1861; *Arch. Naturg.* 1862, p. 130.

*Thous fulvipes*, *Gray, P. Z. S.* 1868, p. 514.

*Hab.* Chili (*Bridges*).

Section II. VULPINÆ. Skull thin, elongate. Postorbital process of the frontal bones bent but little downward, the anterior edge turned up; a longitudinal shallow pit or indentation at its base. Pupil of eye often elliptical, erect. Head slender. Upper incisors scarcely lobed.

## Subfam. III. VULPINA.

*Vulpina*, *Baird, Mamm. N. A.* p. 121; *Gray, P. Z. S.* 1868, p. 514.



- D. THE FOXES. *The tail elongated, reaching to the ground, covered with abundance of soft hair forming a brush, with a gland above the base. Eyes often nocturnal, with oblong erect pupils.*—Gray, l. c. p. 515.

## 12. VULPES.

Muzzle long. Temporal crests of the skull linear or nearly linear. Ears moderate, erect, acute. Tail with soft fur and long hairs uniformly mixed. Bullæ of the ear-bones moderate, oblong, strongly keeled, angular.

Vulpes, *Baird, Mamm. N. A.* p. 121; *Gray, P. Z. S.* 1868, p. 515.

\* *Large. European.*

### 1. Vulpes vulgaris. (Fox.) B.M.

*Canis vulpes*, *Linn. S. N.* i. p. 59; *Blainv. Ostéogr.* t. 4 (skull); *Gray, Cat. Mamm. B. M.* p. 59.

*Vulpes vulgaris*, *Brisson, R. A.* p. 239; *Gerrard, Cat. of Bones of Mamm.* p. 86; *Gray, P. Z. S.* 1868, p. 515.

*Var. 1. Tail-end black.*

*Canis alopes*, *Linn. S. N.* i. p. 59. B.M.

*Renard charbonnier*, *Buffon, H. N.* vii. p. 82.

*Brant Fox, Penn.*

*Var. 2. crucigera.* Fulvous, with a black dorsal cross.

*Vulpes crucigera*, *Brisson, R. A.* p. 240; *Gesner, Quad.* f. at p. 90;

*Aldrov. Quad. Digit.* p. 221, f. at p. 222.

*Cross Fox, Penn.*

*Hab. Europe.*

### *Var. 3. melanogaster.* B.M.

*Vulpes melanogaster*, *Pr. Bonap., Gerrard, Cat. of Bones of Mamm.* p. 86.

\* *Hab. Italy.*

\*\* *Large. African.*

### 2. Vulpes nilotica. (Sobora or Tahaleb.) B.M.

Skull—crown-line narrow behind, elongate triangular in front half.

*Canis niloticus*, *Geoff. Cat. Mus. Paris; Desm. Mamm.* p. 204; *Lechl. Doubl.* p. 4; *Rüppell, Zool. Atlas*, p. 41, t. 15; *Gray, Cat. Mamm. B. M.* p. 60.

*Canis ægyptiacus*, *Sonnini, Nouv. Dict. d'H. N.* vi. p. 524; *Rüppell, Zool. Atlas*, t. 15; *Ehrenb. Symb. Phys.* t. 19.

*Vulpes niloticus*, *Gerrard, Cat. of Bones of Mamm.* p. 85; *Gray, P. Z. S.* 1868, p. 515.

*Hab. North Africa; Egypt.* Called "Tahaleb" by the Egyptians, "Sobora" by the Arabs.

Skulls 172 *a, b, c, d.* Length 5, width 2½ inches.

3. *Vulpes adusta*. (The Burnt Dog.)

*Canis adusta*, *Sundevall, Gerrard, Cat. of Bones of Mamm.* p. 85.

*Vulpes adusta*, *Gray, P. Z. S.* 1868, p. 515.

*Hab.* South Africa. Caffraria (*Sundevall*) (called "Candué").

4. *Vulpes variegata*. (Schom or Abu.) B.M.

*Canis variegatus*, *Rüppell, Zool. Atlas*, p. 31, t. 10; *Ehrenb. Symb. Phys. t.*; *Gray, List Mamm. B. M.* p. 59.

*Canis mesomelas*, var., *Rüppell, Cat. Mus.*

*Vulpes variegata*, *Gray, P. Z. S.* 1868, p. 516.

*Hab.* Upper Egypt and Nubia, called "Abu Schom" by the Arabs (*Rüppell*).

5. *Vulpes mesomelas*. (Tenlie.) B.M.

*Canis mesomelas*, *Ehrenb. Säugeth.* p. 370, t. 95; *Gray, List Mamm. B. M.* p. 58.

*Canis variegatus*, *A. Smith, S. Afr. Quart. Journ.* p. 30.

*Vulpes mesomelas*, *Gray, P. Z. S.* 1868, p. 516.

Jackal, *Kolbe, Besch. des Vorgeb. d. g. Hoffn.* p. 150.

Cape Jackal, *Shaw*.

Renard du Cap, *Cuv. R. A. i.* p. 158.

*Hab.* South and East Africa: Cape of Good Hope (*Kolbe*); Abyssinia (*Rüppell*).

\*\*\* *Large. Asiatic.*

6. *Vulpes flavescens*. (The Persian Fox.) B.M.

Skull—crown-line of adult narrow linear, of young tapering backwards to occiput.

*Vulpes flavescens*, *Gray, Ann. & Mag. N. H.* 1843, xi. p. 118; *List of Mamm. B. M.* p. 60; *P. Z. S.* 1868, p. 516; *Gerrard, Cat. of Bones of Mamm.* p. 86.

*Hab.* India, Salt Range (*Oldham*).

Skulls 1175 *a, b, c.* Length 5 inches, width 2½.

7. *Vulpes montana*. (Hill-Fox.) B.M.

*Vulpes montanus*, *Pearson, J. A. Soc. Beng.* 1836, p. 313; *Gray, List. Mamm. B. M.* p. 195; *P. Z. S.* 1868, p. 516; *Gerrard, Cat. of Bones of Mamm.* p. 86.

*Vulpes nepaulensis*, *Gray, Mag. N. H.* 1837.

*Canis himalaicus*, *Ogilby, P. Z. S.* 1836, p. 183; *Royle, Illust. Cashmere*, t. (B.M.).

*Hab.* Nepal (*Rev. R. Ewing*); Thibet.

Skull 176 *a.*

8. *Vulpes Griffithsii*.

*Vulpes Griffithsii*, *Blyth, J. A. Soc. Beng.* 1854, p. 729; *Gray, P. Z. S.* 1868, p. 516.

*Hab.* Afghanistan.

\*\*\*\* *Small. Asiatic.*

9. *Vulpes ferrilatus.*

B.M.

*Vulpes ferrilatus*, *Hodgson*; *Gray*, *P. Z. S.* 1868, p. 516.

*Hab.* Thibet.

10. *Vulpes leucopus.*

B.M.

*Vulpes leucopus*, *Blyth*, *J. A. Soc. Beng.* 1854, p. 729; *Gray*, *P. Z. S.* 1868, p. 516.

*Hab.* North-west India: Mooltan.

11. *Vulpes japonica.*

B.M.

Skull—crown-plate elongate, slender, tapering behind to the occiput (adult).

*Vulpes japonicus*, *Gerrard*, *Cut. of Bones of Mamm.* p. 86; *Gray*, *P. Z. S.* 1868, p. 517.

*Hab.* Japan.

Skull 180 *a.* Length 5 inches, width  $2\frac{1}{2}$ .

Fig. 28.



Skull of *Vulpes bengalensis*. (India, No. 174 *b.*)

12. *Vulpes bengalensis.* (Kokree.)

B.M.

Skull—crown-plate wide towards the occiput, vase-shaped.

*Canis bengalensis*, *Shaw*, *Zool.* i. p. 230.

*Canis rufescens*, *Gray*, *Ill. Ind. Zool.* ii. t. 3.

*Canis kokree*, *Sykes*, *P. Z. S.* i. p. 101.

*Canis corsac*, *Blyth*.

*Vulpes corsac*, *Ogilby*, *P. Z. S.*

*Vulpes indicus*, *Hodgson*.

*Vulpes bengalensis*, *Gray*, *Ill. Ind. Zool.* ii. t. 2; *P. Z. S.* 1868, p. 517, f. 6; *Gerrard*, *Cut. of Bones of Mamm.* p. 86.

Bengal Dog, *Penn. Quad.* i. p. 160.



*Var.* *Canis xanthurus*, *Gray*, *P. Z. S.* 1837, p. 68.

*Canis chrysurus*, *Gray*, *Mag. N. H.* 1836, p. 577.

*Hab.* India; Bengal.

Skulls 174 *a-f.* Length  $4\frac{1}{4}$  inches, width  $2\frac{1}{2}$ .

### 13. *Vulpes pusilla*. (Small Fox.)

*Vulpes pusilla*, *Blyth*, *Journ. Asiat. Soc. Beng.* 1854, p. 729; *Gray*, *P. Z. S.* 1868, p. 517.

*Hab.* Pendschab?

### 14. *Vulpes karagan*. (Karagan.)

"Larger than the Corsac."

*Canis karagan*, *Erxl. Syst.* p. 556.

*Vulpes karagan*, *Gray*, *P. Z. S.* 1868, p. 517.

*Canis melanotus*, *Pallas*, *Zoog. Rosso-Asiat.* i. p. 44.

*Karagan*, *Schreb. Säugeth.* p. 359.

Karagan Fox, *Shaw*.

*Hab.* Ural and Tartary.

### 15. *Vulpes corsac*. (Corsac.)

B.M.

*Canis corsac*, *Linn. S. N.* i. p. 223; *Tiles. Nov. Acta Acad. Nat. Cur.* xi. p. 400, t. 49; *Pallas*, *Zoog. Rosso-Asiat.* i. 41, t. 4; *Blainv.*

*Ostéogr.* t. 5 (skull).

*Vulpes corsac*, *Gray*, *List. Mamm. B. M.* p. 62; *P. Z. S.* 1868, p. 518.

? *Isatis* or *Adive*, *Buffon*, *H. N. Supp.* iii. t. 17.

Corsac Fox, *Penn.*

Corsac, *Cuv. Règne Anim.* i. p. 155.

*Bab.* Tartary, in deserts; Siberia.

\*\*\*\*\* *Large. American.*

### 16. *Vulpes pennsylvanica*. (Cross Fox.)

B.M.

Hair long, silky and soft; tail very full, composed of an under-fur with long hair distributed uniformly among it. Tail with a white tip; feet and ears black. Ears with both sides covered with hair.

*Canis fulvus*, *Rich. Fauna B.-Amer.* p. 93, 1829; *Aud. & Bach. N. A. Quad.* ii. pp. 263, 414, tt. 87, 116, iii. p. 70; *Desm. Mamm.* p. 203.

*Canis argentatus*, *Shaw*, *Zool.* i. p. 328.

*Canis vulpes*, var. *δ. pennsylvanicus*, *Bodd. Elench.* i. p. 96, 1784.

*Canis decussatus*, *Geoff. Mus. Par.*; *Desm. Mamm.* p. 203.

*Canis cruciger*, *Schreb. Säugeth.* t. 91 a.

Renard argenté, *Charlevoix*, *N. France*, i. p. 196; *Cuv. R. A.* i. p. 155;

*Geoff. Mam. Lithog.*

Renard de Virginie, *Palisot de Beauvois*, *Bull. Soc. Philom.*

Pennsylvanian Brant Fox, *Penn.*

*Vulpes fulvus*, *S. Baird*, *N. A. Mam.* p. 123; *Gerrard*, *Cat. of Bones of Mamm.* p. 85.

*Canis vulpes nigra americana*, *Blainv. Ostéogr.* t. 2 (skeleton).

*Vulpes pennsylvanica*, *Gray, P. Z. S.* 1868, p. 518.

*Hab.* North America.

Var. 1. *fulva*. "Reddish yellow; back behind grizzly; throat greenish; a narrow line on the belly white; ears behind, and tips of caudal hairs, except terminal brush, black." Skulls 173 *a, b, c, d*.

Var. 2. *decussatus*. "Muzzle and underparts, with the legs, black; tail blacker than in var. 1; a dark band between the shoulders, crossed by another over the shoulders."

*Canis decussatus*, *Desm.*

B.M.

*Canis fulvus decussatus*, *Rich., Baird.*

*Vulpes fulvus decussatus*, *Aud. & Bach.*

Cross Fox.

Var. 3. *argentata*. "Entirely black, except on the posterior part of the back, where the hairs are annulated with grey; tail-tip white;" foot-pads often covered with hair.

*Canis argentatus*, *Shaw.*

*Canis fulvus argentatus*, *Rich., Baird.*

*Vulpes fulvus argentatus*, *Aud. & Bach.*

*Renard noir d'Amérique*, *Blainv. Ostéogr.* t. 12 (skeleton).

Silver or Black Fox.

Var. 4. *macrura*. Larger, varies in colour like the smaller varieties; foot-pads covered with hair.

Skulls 1402 *a, b*. Length  $5\frac{1}{4}$  inches, width  $2\frac{1}{2}$ .

*Vulpes macrourus*, *Baird, in Stansbury's Explor. Great Salt Lake*, p. 309, 1852; *Mamm. N. A.* p. 130.

*Vulpes utah*, *Aud. & Bach. Proc. A. N. S. Philad.* v. p. 114; *N. A. Quad.* iii. p. 255, t. 151.

? *Vulpes fulvus*, *Pr. Max. Reise*, ii. p. 98, 1841.

*Hab.* Great Salt Lake.

### 17. *Vulpes velox*. (Burrowing Fox.)

B.M.

*Canis velox*, *Say in Long's Exped.* i. p. 486, 1823.

*Vulpes velox*, *Aud. & Bach. N. A. Quad.* ii. p. 13, t. 52, 1851; *S. Baird, Mamm. N. A.* p. 133; *Gerrard, Cat. of Bones of Mamm.* p. 88; *Gray, P. Z. S.* 1868, p. 519.

Burrowing Fox, *Lewis & Clarke's Travels*, ii. p. 351.

Kit-Fox, *Lewis & Clarke, ibid.*

*Canis cinereo-argentatus*, *Sabine, Franklin's Jour.* p. 658; *Blainv. Ostéogr.* t. 4 (skull).

*Canis vulpes cinereo-argentatus*, *Rich. F. B.-A.* p. 98, 1827.

*Vulpes cinereo-argentatus*, *Gray, List Mamm. B. M.* p. 60; *Gerrard, Cat. of Bones of Mamm.* p. 87.

*Canis microtis* (or Kit-Fox), *Reichenb. Règne Anim.* i. p. 10, f. 72, 73.

*Hab.* North America, Missouri, burrowing in the earth.

### 13. FENNECUS.

Ears large, elongate, hairy, spreading. Tail elongate, bushy, covered with soft hairs. Pupil roundish?

Skull elongate; brain-case ovate. Temporal muscles separated from each other by a very wide urn-shaped crown to the occiput. Upper premolars compressed; flesh-tooth compressed, with a small internal process in front; tubercular grinder much wider than long. Bullæ of ears very large, thin, swollen and rounded below. Africa.

*Fennecus*, Gray, *P. Z. S.* 1868, p. 519.

### 1. *Fennecus dorsalis*. (Sabora.)

B.M.

*Canis dorsalis*, Gray, *P. Z. S.* 1837, p. 132. (B.M.)

? *Canis famelicus*, Rüppell, *Zool. Atlas*, p. 15, t. 56.

*Fennecus Rüppellii*, Schinz, *Cuv. Thierr.* iv. p. 508.

*Fennecus dorsalis*, Gray, *P. Z. S.* 1868, p. 519.

*Hab.* Sandy deserts of Nubia and Cordofan (called "Sabora" by the Arabs); West Africa, Senegal (B.M.).

### 2. *Fennecus zaarensis*. (Fennec.)

B.M.

*Canis zerda*, Zimmerm. *Geogr. Gesch.* ii. p. 242; Leuckart, *Isis*, 1825, p. 211; Rüppell, *Zool. Atlas*, p. 5, t. 2.

*Fennecus zaarensis*, Gray, *P. Z. S.* 1868, p. 519.

*Canis cerdo*, Gmelin, *S. N.* i. p. 75.

*Canis fennecus*, Lesson, *Man.* p. 168.

*Megalotis cerdo*, Teng. *Prod.* p. 131.

*Fennecus cerdo*, Gray, *Denham*, i. p. 85.

*Fennecus arabicus*, Sonnini & Desm. *N. Dict. d'H. N.* xi. p. 342.

*Fennecus Brucei*, Desm. *Mamm.* p. 235; *Enc. Méth.* t. 108. f. 9.

*Viverra aurita*, Blumenb. *Handb.* p. 95.

*Vulpes minimus zoarensis*, Skjöldebrand in *K. Vetens. Akad. Hand.* 1777, p. 265, t. 6.

*Vulpes zoarensis*, Gray, *List Mamm. B. M.* p. 62; Gerrard, *Cat of Bones of Mamm.* p. 87.

*Fennec*, Bruce, *Travels*, v. p. 128, t. 28.

Animal anonyme, Buffon, *H. N. Suppl.* iii. p. 148, t. 19.

Whitish Dog, Shaw (from Bruce).

*Hab.* Northern Africa (Bruce, Rüppell), Algiers.

Skull 182 c.

### 3. *Fennecus pallidus*. (Hosseen.)

B.M.

*Canis pallidus*, Rüppell, *Zool. Atlas*, p. 33, t. 11.

*Vulpes pallidus*, Gerrard, *Cat. of Bones of Mamm.* p. 87.

*Fennecus pallidus*, Gray, *P. Z. S.* 1868, p. 520.

*Hab.* Darfur and Cordofan (Rüppell) (called "Abu Hosseen" by the Arabs).

Skull 814 a; orbits very large. Skull 814 b, described by M. de Blainville when in the Museum of the Zool. Soc.

### 4. *Fennecus caama*. (The Asse.)

B.M.

Skull—the crown broad, vase-shaped, rather contracted behind, and linear near the occiput.



*Canis caama*, *A. Smith, South African Quart. Journ.*  
*Vulpes caama*, *Gerrard, Cat. of Bones of Mamm.* p. 87.

*Hab.* South Africa (*Dr. A. Smith*).

The skull 815 *a* in the British Museum, out of this skin, is very like that of *Urocyon virginianus* in the form of the crown-plate, but it differs from that skull in the bullæ of the ear-bones being longer, more ventricose and rounded, and in the last upper tubercular grinder being small and more triangular, narrower on the inner edge.

Fig. 29.



Skull of *Fennecus caama*. (South Africa, No. 815 *a*.)

#### 14. LEUCOCYON.

Tail very full and bushy; soles of feet densely furred. Fur, of the adult, white; of the young, greyish lead-colour. Pupil oblong, erect. Skull short; nose broad below the orbits.

*Leucocyon*, *Gray, P. Z. S.* 1868, p. 521.

##### *Leucocyon lagopus*.

B.M.

*Canis lagopus*, *Linn. Fauna Suec.* p. 4; *S. N. i.* p. 59; *Pallas, Zoog. Rosso-Asiat.* i. p. 51, t. 5; *Tilesius, Nov. Acta Acad. Nat. Cur.* xi. p. 375, t. 47; *Blainv. Ostéogr.* t. 5 (skull).

*Canis (Vulpes) lagopus*, *Rich. F. Bor.-Amer.* i. p. 83, 1829.

*Vulpes lagopus*, *Aud. & Bach. N. A. Quad.* ii. p. 89, t. 121, 1829; *Gray, List Mamm. B. M.* p. 60; *Gerrard, Cat. of Bones of Mamm.* p. 88.

*Leucocyon lagopus*, *Gray, P. Z. S.* 1868, p. 521.

Renard blanc, *Buffon, H. N. Suppl.* vii. t. 51.

Arctic Fox, *Pennant, Shaw.* (Skulls 780 *a, c, d*.)

*Junior?* Sooty black. Skull shorter and broader.

*Canis fuliginosus*, *Shaw, Zool.* i. p. 351. (Skulls 1316 *a, b, c*.)

Sooty Fox, *Pennant*.

*Isatis gris*, *F. Cuv. Mamm. Lithog.*

*Vulpes fuliginosus*, *Gerrard, Cat. of Bones of Mamm.* p. 88.

*Vulpes lagopus* (Arctic Fox), *Aud. & Bach. N. A. Quad.* iii. t. 122 ;

*Baird, Mamm. N. A.* p. 137.

*Canis isatis*, *Gmelin, Nov. Com. Petrop.* v. p. 358.

*Hab.* Arctic region : Newfoundland (*Audubon*).

*Var.* smaller? *Pessey* or *Golubri*.

*Canis isatis*, *Gmelin, Nov. Com. Petrop.* v. p. 358 ; *Thienem.*

*Canis lagopus*, *Pallas, Zoogr. R.-Asiat.* i. p. 51, t. 5 ; *Tiles. N. Act. Nat. Cur.* xi. p. 375, t. 47.

*Canis isatis*, *Gmelin, Nov. Com.* v. p. 358 ; *Buffon, H. N.* xiii. p. 372 (part.).

*Hab.* North Asia.

- E. BRISTLE-TAILED FOXES. *Tail elongate, covered with soft elongated hair and with a central concealed crest of stiff hairs unmixed with soft fur. Skull—temporal muscles separated by a wide flat crown, narrow at the occiput.*—*Gray, P. Z. S.* 1868, p. 521.

## 15. UROCYON.

Muzzle short. Temporal crests of the skull always widely separated. Postorbital process thin, spread out, concave above. A supplementary tubercle on the lower sectorial. The under jaw with an angular emargination below. Pupil — ? Bullæ of ear-bones moderate, ovate, swollen. Upper tubercular grinders large, long and broad.

*Urocyon*, *Baird, Mamm. N. A.* p. 121 ; *Gray, P. Z. S.* 1868, p. 521.

### 1. *Urocyon virginianus*. (Grey Fox.)

B.M.

*Canis virginianus*, *Erzl. S. A.* p. 567, 1777 (from *Catesby*).

*Canis vulpes virginianus*, *Rich. F. B. A.* i. p. 96, 1827.

*Vulpes virginianus*, *Dekay, N. Y. Zool.* i. p. 45, t. 7. f. 2, 1842 ; *Aud. & Bach. N. A. Quad.* i. p. 162, t. 21.

*Canis cinereo-argenteus*, *Erzl. S. A.* p. 576, 1777 ; *Schreber, Säugeth.* p. 360, t. 92, 1778.

*Canis griseus*, *Bodd. Elench. Anim.* i. p. 97, 1784.

*Urocyon virginianus*, *Gray, P. Z. S.* 1868, p. 522.

Grey Fox, *Catesby, Carol.* ii. p. 78, t. 78, 1731 ; *Pennant.*

Corsak Fox, *Penn. Quad.* p. 235, 1781 (not *Linn.*).

*Vulpes* (*Urocyon*) *virginianus*, *S. Baird, Mamm. N. A.* p. 138.

Fulvous-necked Fox, *Shaw.*

Renard tricolore, *Cuv. R. A.* i. p. 155.

*Hab.* North America. Skulls 179 *a, b, c, d, e*, female adult.

### 2. *Urocyon littoralis*. (Coast-Fox, or Short-tailed Fox.)

Tail one-third the length of the body, with a concealed mane of stiff hairs and with a black stripe above. Fur above hairy and

black; sides of neck, fore legs, and lower part of sides dull cinnamon; chin and sides of muzzle black.

*Vulpes (Urocyon) littoralis*, *S. Baird, Mamm. N. A.* p. 143, t. 1 (animal), t. 35, f. 2 (skull).

*Urocyon littoralis*, *Gray, P. Z. S.* 1868, p. 522.

*Hab.* California, Island of San Miguel.

Scarcely more than half the size of the Grey Fox (*U. virginianus*).

**F. RACCOON DOG.** *Tail short, bushy; upper sectorial tooth compressed, three-lobed, with a small internal tubercle. Temporal muscles separated by a vase-shaped crown.*—*Gray, l. c.* p. 522.

### 16. NYCTEREUTES.

Tail short, bushy, straight. Teeth 42; premolars  $\frac{4}{4}$  ·  $\frac{4}{4}$ , molars  $\frac{3}{2}$  ·  $\frac{3}{2}$ ; sectorial tooth compressed, with a small internal tubercle rather in front of the fore edge of the body of the tooth.

Skull broad; nose moderate, tapering; postorbital process thin, rather concave above, bent down at the tip. Crown of the head broad, vase-like, separating the temporal muscles nearly to the occiput. Lower edge of lower jaw straight.

*Nyctereutes*, *Temm.; Gray, List of Mamm.* 1840; *P. Z. S.* 1868, p. 522.

***Nyctereutes procyonoides.*** (Tanate, or the Raccoon Dog.) B.M.

*Canis procyonoides*, *Gray, Illustr. Ind. Zool.* ii. t.; *Mag. N. H.* 1837, p. 578; *Schrenck, Amurland*, p. 53, t. 5.

*Canis (Nyctereutes) viverrinus*, *Tem. Fauna Japon.* t. 8; *Schrenck, Reisen*, figs. 2-6.

*Nyctereutes procyonoides*, *Gray, List of Mamm. B. M.* p. 62; *P. Z. S.* 1868, p. 522; *Gerrard, Cat. of Bones of Mamm.* p. 89.

*Hab.* China? Japan (*Reeve*); Amoorland.

## Fam. 11. MEGALOTIDÆ.

Teeth 46: molars  $\frac{7}{5}$  ·  $\frac{7}{5}$ ; premolars  $\frac{3}{4}$  ·  $\frac{3}{4}$ . Sectorial grinders  $\frac{1}{1}$  ·  $\frac{1}{1}$ , small; upper triangular, with a broad internal lobe; lower compressed. Tubercular molars  $\frac{3}{3}$  ·  $\frac{3}{3}$ ; upper oblong, transverse; lower four-sided, front lower largest, last lower least, the rest subequal. Upper sectorial grinder short, triangular, as wide as long. Tail short, straight, bushy, not reaching to the heels.

*Megalotina*, *Gray, P. Z. S.* 1868, p. 523.



Skull elongate; nose slender, elongate. Temporal muscles separated by a broad flat crown to the occiput, which is formed with a raised edge. The three first upper grinders are compressed; the front one in the middle of a wide space, very small; the hinder premolar triangular, about as long as broad, and the three following oblong transverse, the two front subequal, and the hinder smaller; the lower premolars compressed; the flesh-tooth small, with a fine tubercle; these teeth become worn down with a flat crown.

### MEGALOTIS.

Forehead and crown flat, broad, with a raised margin, and separating the temporal muscles to the occiput. Skull elongate; face very long, tapering. Teeth 48. Grinders  $\frac{8}{3} \cdot \frac{8}{3}$ . Premolars  $\frac{3}{3} \cdot \frac{3}{3}$ . Sectorial  $\frac{1}{1} \cdot \frac{1}{1}$ , small; upper triangular, with a broad internal lobe; lower compressed. Tubercular molars  $\frac{3}{3} \cdot \frac{3}{3}$ ; front lower largest, last lower least, the rest subequal.

*Megalotis*, *Blainv. Ann. Franç. et Etrang. d'Anat.* i. t. 8. f. 1, 1 a, b (skull and teeth); *Gray, P. Z. S.* 1868, p. 523.

*Agrodius*, *H. Smith*, 1839.

*Otocyon*, *Licht.*

This genus has the teeth very like those of the suborder Omnivora.

### *Megalotis Lalandii.*

B.M.

*Canis megalotis*, *Desm. Mamm. Suppl.* p. 538; *Blainv. Ostéogr.* t. 1 (skeleton), t. 4 (skull).

*Canis Lalandii*, *Desm. Dict. Class. d'H. N.* iv. p. 18, t.

*Megalotis Lalandii*, *Gray, Griff. An. Kingd.* t. 54; *P. Z. S.* 1868, p. 523.

*Otocyon caffer*, *Licht.*

*Otocyon Lalandii*, *Gerrard, Cat. of B. of Mamm.* p. 90.

The Fennec of Delalande, *Griffith, A. K.* ii. t. 54, p. 372 (from *Mus. Paris*).

*Hab.* South Africa; Cape of Good Hope (*Lalande*).

## Fam. 12. HYÆNIDÆ.

Head rather elongate; nose rounded, flat and bald beneath, with a central longitudinal groove. Skull—muzzle narrowed in front. Teeth large, well-developed, 34. Tubercular grinders single, only in the upper jaw. Feet produced; toes straight, free, with blunt, exposed, worn claws. Tail short, bushy.

*Synopsis of the Genera.*

1. **HYÆNA.** With a large, deep subcaudal gland. The tubercular grinders of upper jaw elongate, with three roots. The flesh-tooth with three equal-sized lobes, the front lobe large.
2. **CROCUTA.** No subcaudal gland. The tubercular grinders of upper jaw small, with two roots. Flesh-tooth with unequal lobes, the front one small, and the hinder elongate.

1. **HYÆNA.**

A large, deep subanal gland. The tubercular grinders of the upper jaw elongate, transverse, with three roots. The flesh-tooth with large, broad, equal-sized lobes. Legs subequal.

*Hyæna*, *Linn.*; *Gray*, *P. Z. S.* 1868, p. 524.

\* *The brain-case of the skull compressed. Fur clouded; hair very long.*

1. **Hyæna brunnea.**

B.M.

*Hyæna brunnea*, *F. Cuv. Dict. Sc. Nat.* xxii. p. 294; *Busk, Proc. Linn. Soc.*; *Gray*, *P. Z. S.* 1868, p. 524.

*Hyæna fusca*, *Geoff. Dict. Class. H. N.* vii. p. 444, t. 2. f. ; *Fischer, Syn.* p. 195.

*Hyène*, *Buffon, H. N. Suppl.* p. 111, t. 46.

*Hab.* South Africa.

\*\* *Skull with the brain-case swollen behind. The fur banded.*

2. **Hyæna striata.**

*Canis hyæna*, *Linn. S. N.* i. p. 58.

*Hyæna striata*, *Zimmerm. Geogr.* ii. p. 256; *Gray*, *P. Z. S.* 1868, p. 524.

*Hyæna vulgaris*, *Desm. Mamm.* p. 215.

*Hyæna orientalis*, *Tiedem. Zool.* i. p. 500.

*Hyæna antiquorum*, *Temm. Ann. Gén. Sci. Phys.* iii. p. 51.

Striped *Hyæna*, *Fenn.*

*Hyæna virgata*, *P. Z. S.* 1856, p. 397.

*Hab.* North, West, and South Africa.

2. **CROCUTA.**

Subanal gland none. Tubercular grinders of the upper jaw small, with two roots. Flesh-tooth of the under jaw with unequal lobes; the front lobe small, and the hinder one broad. Fur spotted. The hinder legs short.

*Crocuta*, *Gray, Kaup*; *P. Z. S.* 1868, p. 525.

*Crocuta maculata.*

B.M.

- Canis crocuta*, *Erzl. Syst.* p. 578.  
*Hyæna crocuta*, *Zimmerm. Geog.* ii. p. 256; *Busk, Proc. Linn. Soc.*  
*Hyæna capensis*, *Desm. Mamm.* p. 216.  
*Hyæna maculata*, *Thunb. Acad. de St. Pétersb.* iii. p. 303.  
 ? *Hyæna rufa*, *Cuv. Oss. Foss.*  
*Crocuta maculata*, *Gray, P. Z. S.* 1868, p. 525.  
 Spotted *Hyæna*, *Penn. Syn.* p. 162, t. 17.  
*Tygerwolf*, *Kolbe, Vorgeb.* p. 171, t. 8. f. 5.

*Hab.* South Africa.

## Fam. 13. PROTELEIDÆ.

Head elongate, nose very broad. Back slightly crested with long hairs. Legs elongate, hind legs rather the longer. Claws compressed, exposed, rather blunt; hind part of heel hairy. Digitigrade. Skull oblong, face very broad, and rounded in front; bullæ of ears large; palate broad, concave, as wide before as behind; internal nasal opening wide. Cutting-teeth  $\frac{5}{8}$ ; canines conical, small; grinders  $\frac{1}{4}$ .  $\frac{1}{4}$ , very small, far apart; false grinders conical, compressed, small; flesh-tooth of upper jaw very small, triangular; the fourth grinder in lower jaw very small, rudimentary; tubercular grinders none above or below; the front lower false grinder largest, conical, carved like a canine, and separated from the canine by a wide space.

They have "the habit as well as appearance of *Hyæna*, and have the same mode of endeavouring to save their feet from injury when fighting or defending themselves, by doubling them under them and walking or crawling on the wrist- or ankle-joints." "He [*Proteles Lalandii*] snarls or snaps at you, and has the same kind of face, eyes, and growl as those animals."—*Bartlett*, 5th Dec. 1868.

## PROTELES.

Grinders  $\frac{1}{4}$ .  $\frac{1}{4}$ , far apart, rudimentary; no hinder upper tubercular grinder.

G. and F. Cuvier arranged this genus with the *Viverræ*, Blainville with the Dogs. It has the external form and colours of the *Hyæna*. The skull is unlike either of these families; indeed it is very unlike any genus of Carnivora that I am acquainted with.



**Proteles Lalandii.** (Aard Wolf.)

B.M.

Grey, black-banded.

Proteles Lalandii, *I. Geoff. Mém. Mus.* xi. p. 370, t. 20; *Blainville, Ostéog. Canis*, t. 4 (skeleton).Viverra hyænoides, *Desm. Mamm.* p. 538.Genette hyénoïde, *Cuv. Os. Foss.* iv. p. 388.Civette hyénoïde, *F. Cuv. Dict. Sc. Nat.* xii. p. 300.Proteles cristatus, *I. Geoff. Mag. de Zool.* 1841, i. t. 30 (skull); *Gerard, Cat. of Bones of Mamm.* p. 70; *Gray, P. Z. S.* 1868, p. 525.*Hab.* South Africa; Cape of Good Hope.

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**Suborder II. OMNIVORA.**

The grinders all of nearly the same form, and gradually passing into each other, only varying in size from the false grinder to the tubercular grinder, and without any distinct sharp-edged flesh-tooth.

Ursidæ, *Gray, P. Z. S.* 1864, p. 678.

*Synopsis of the Families.*

Section I. **Brachypoda.** Toes straight, claws exerted.

Fam. 1. **URSIDÆ.** Nose short. Body massive; limbs short. Tail very short. Teeth 42.

Fam. 2. **NASUIDÆ.** Nose elongate, mobile, underside convex, rather bald, without any longitudinal central groove. Tail elongate. Teeth 40.

Fam. 3. **PROCRONIDÆ.** Nose short, bald, underside flat, hairy, with a central longitudinal groove. Tail elongate. Teeth 40.

Section II. **Dendropoda.** Toes short, arched, webbed; claws retractile, sharp-pointed. Head short.

Fam. 4. **CERCOLEPTIDÆ.** Tail elongate, prehensile; soles of the feet bald.

Fam. 5. **BASSARIDÆ.** Tail subcylindrical, elongate, not prehensile. Soles of the hind feet hairy.

Fam. 6. **AILURIDÆ.** Tail bushy, not prehensile. Soles of the feet hairy. Grinders very tubercular.

The Omnivorous Mammalia (*Omnivora*) are differentiated from the Carnivora by having the hind upper grinders (that is to say, the hinder false grinder, the flesh-tooth, and the tubercular teeth) very similar in form; they are broad and strongly tubercular. The three hinder teeth in the lower jaw are similar, but they are narrower and more elongate.

They form a very natural group, consisting only of a limited number of species. The species require particular study, as they are very similar externally, and the skull and teeth, which are very similar in many of the specimens, appear to be liable to a considerable amount of variation in specimens from the same locality, and with the same habits.

The examination of the bones, and especially the skulls, of the *Ursidæ* shows still further than the study of the bones of the *Viverridæ* the necessity of great caution in depending on the study of osteological specimens for the distinction of species. The fact that M. de Blainville considers the Californian Grizzly Bear, after a very careful study and comparison of its bones, to be only a variety of the common European Bear, shows how a most experienced and accurate osteologist may be misled by placing too much confidence in a single branch of study. If such a naturalist may be so misled by the study of the bones of recent animals, how much more caution is required in giving any opinion or forming any theory on the study of fossil specimens of bones, where the determination of the osteologist cannot be verified by the examination of other parts of the animal in its perfect state!

The species of *Omnivora* are distributed over Europe, Asia, Africa, and America, and they are generally inhabitants of the mountainous regions of these countries. One species is marine, and common to the Arctic parts of Europe, Asia, and America.

## Section I. BROAD-FOOTED BEARS (*BRACHYPODA*).

The feet broad and short, generally bald and callous below; toes straight; the claws exerted, more or less curved, blunt.

*Brachypoda*, Gray, *Proc. Zool. Soc.* 1864, pp. 506, 679.

### Fam. 1. URSIDÆ.

Tail short or none; body massive, limbs short.

*Ursina*, Gray, *Cat. Mamm. B. M.* p. 72; *P. Z. S.* 1864, p. 679.

They sometimes climb trees, but usually descend backwards. When running, they carry their young on their back.

The young born naked and blind, of a very small size; their eyes open and they become covered with short thick black fur when about five weeks old (Bartlett, *P. Z. S.* 1860, p. 130).

In the 'Annals of Philosophy' for 1825, I divided the Bears into groups, according to the characters of their feet and claws, and into the genera *Ursus*, *Danis*, *Prochilus*, and *Thalassarctos*.

The examination of the series of skulls of Bears in the Museum, like the examination of the series of bones of the Viverridæ, has strongly impressed me with the uncertainty that must always attend the determination of fossil bones, or indeed of bones of all animals when we have only the skulls or other bones of the body to compare with one another. There can be no doubt that the study and comparison of the bones of the different species is very important—that the skull and teeth afford some of the best characters for the distinction of the genera and species; but few zoologists and palæontologists have made sufficient allowance for the variations that the bones of the same species assume. In the Bears I have observed that there is often more difference between the skulls of Bears of the same species from the same locality than between the skulls of two undoubted species from very different habitats and with very different habits. Thus I have the skulls of some Bears, the habitat of which is not certainly known, which I have doubted whether they should be referred to the Thibet Bear (*U. torquatus*) or to the North-American species (*U. americanus*); but I have referred them to the latter with doubt, as they were said to have come from the latter country. It is the same with regard to the skull of a Bear that lived in the Zoological Gardens for years, which has the general form of the skull and the wide palate of the European Bear, but the long last grinder and some other characters of the *Ursus ferox*.

This similarity of the skull is more remarkable, as no two Bears can be more distinct from each other than the species above named which have such similar skulls, showing that similar skulls do not always imply very nearly allied or doubtfully distinct species.

The Bears may be arranged, by the size of the tubercular grinders, thus:—

Very large, more than half as long again as the flesh-tooth. (The number gives the medium measurement of the flesh-tooth, in inches and twelfths.) 1" 4", *Ursus isabellinus*. 1" 5", *U. cinereus*. 1" 4", *U. grandis*. 1" 3", *U. torquatus*.

Moderate, above half as long again as the flesh-tooth. *Thalassarctos maritimus*. 1" 2", *Ursus arctos*. 1", *U. arboreus*. 1", *U. americanus*. 1" 6", *Myrmarcos*.

Small, only rather larger than the flesh-tooth. *Helarctos malayanus*, *Melursus libycus*.



*Synopsis of the Genera.*

A. Sea-Bears. *Soles of the feet hairy, with a few bald pads. The tubercular grinder longer than the flesh-tooth. Lips slightly extensile. Cutting-teeth  $\frac{2}{3}$ . Ears rounded, hairy.*

1. THALASSARCTOS. Nose of skull produced, longer than broad. Front false grinders small, far apart; upper tubercular moderate.

B. Land-Bears. *Soles of the feet bald, callous. Cutting-teeth  $\frac{2}{3}$ . Lips slightly extensile. Cover of nostrils moderate. Ears rounded, hairy. Underside of the base of the toes hairy.*

2. URSUS. Nose of skull produced, longer than broad, rounded above. Forehead convex, separated from the nose by a cross line. False grinders far apart, small. Palate flat. Brain-case swollen. Lower jaw moderate.

3. MYRMARCTOS. Nose of the skull produced, much longer than broad, flat above. Nose, forehead, and front of crown all on one line. False grinders far apart, small. Palate concave. Brain-case compressed. Lower jaw large, elongate.

4. HELARCTOS. Nose of skull very short, as broad as long, forming a line with the forehead. False grinders crowded, large. Palate broad, flat.

C. Honey-Bears. *Soles of the feet bald, callous. Cutting-teeth  $\frac{1}{3}$ . Lips very extensile. Nostrils large, with a large cover. Front of palate bent up. Ears tufted. Underside of base of toes bald.*

5. MELURSUS. Nose of the skull produced, longer than broad, rounded above. False grinders far apart; upper hinder tubercular short.

A. Sea-Bears. *Soles of the feet covered with close-set hairs, with a few small bald pads. Head elongate; forehead scarcely raised above the line of the nose; cutting-teeth  $\frac{2}{3}$ ; lips slightly extensile; nostrils moderate.*

## 1. THALASSARCTOS.

Head elongate; ears rounded, hairy; forehead scarcely raised above the line of the nose. Neck elongate. Feet broad, large; front claws elongate, curved. Fur short, soft, dense. Skull elongate. The upper tubercular grinder elongate. The palate broad, concave, rather contracted behind, and then suddenly contracted behind the last tooth. The hinder nasal aperture elongate, narrow, the sides much longer than the front edge, which is arched; the sides bent in towards the middle, contracting the aperture.

Sea-Bears (Thalassarctos), Gray, *Ann. of Philos.* 1825; *P. Z. S.* 1864, p. 680.

Thalassarctus, Gloyer, 1842.

*Hab.* Arctic Seas.

**Thalassarcos maritimus.**

B.M.

White or yellowish white.

*Ursus maritimus*, *Desm. Mamm.* p. 165; *Schreb. Säugeth.* p. 513, t. 141\*; *Fischer, Syn. Mamm.* p. 145; *Baird, Mamm. N. A.* t. 44 (skull); *Temm. Fauna Japon.* p. 29; *Schrenck, Amurland.* i. p. 16.

*Ursus marinus*, *Pallas, Reis.* iii. p. 691; *P. Z. S.* 1859, p. 102.

*Ursus polaris*, *Shaw, Mus. Lever.* i. p. 7, t. 2.

*Ursus albus*, *Brisson, Règne Anim.* p. 260.

*Thalarcos polaris*, *Gray, Ann. Philos.* 1825, p. 62.

*Thalassarcos maritimus*, *Gray, Cat. Mamm. B. M.* p. 73; *P. Z. S.* 1864, p. 680.

*Ours blanc* (*Ursus maritimus*), *Buffon, H. N.* xv. p. 128; *Suppl.* iii. p. 200, t. 34; *De Blainv. Ostéogr.* t. 1 (skeleton ♀), t. 4 (bones), t. 5 (skull ♀).

*Ours polaire*, *Cuv. Ménag. Mus.*; *Oss. Foss.* iv. t. 20. f. 4, t. 21. f. 4.

*Polar Bear*, *Penn. Syn.* p. 192, t. 20. f. 1; *Shaw, Zool.* i. p. 257, t. 105.

*Hab.* Arctic Seas of Europe, Asia, and America: Japan (*Siebold*).

Skulls.	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbit.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
221c. Adult .....	1	2	15	39	6	3	7	4	0	7	9	2	7	4	9	2	2	2
221d. Young .....	1	0	12	6	8	0	2	9	3	0	6	6	2	0	3	11	1	9
221h. Young .....	1	0	12	6	7	0	2	8	2	11	6	7	2	3	3	9	1	6

B. Land-Bears. Soles of the feet bald, callous. Cutting-teeth 6. 6. Ears rounded, hairy. Lips slightly extensile. Nostrils oval, with a moderate lid. Underside of the base of the toes hairy. The upper tubercular grinder elongate.

**2. URSUS.** (Carrion Bear.)

Head elongate. Ears rounded, hairy. Nose rather produced, compressed. Forehead rounded. Nostrils ovate, covered with a moderate lid. The underside of the base of the toes covered with hair, making a hairy band between the toe-pads and the soles of the feet. Nose of the skull produced, as wide or wider than the forehead between the orbits, rounded above, separated from the more or less convex forehead by a cross line, which is less distinct as the animal becomes aged. Front false grinders small, far apart; hinder tubercular grinder large, elongate, larger than the flesh-tooth. Palate flat or slightly concave. The aperture of the hinder nostrils with the sides longer than the width of the front edge. The aperture for the blood-vessel to the palate is behind the front edge of the tubercular grinder.

*Ursus*, *Gray, P. Z. S.* 1864, p. 681.

Middendorff, in his 'Mammalia of North and East Siberia,' has a very long essay on the Bears. He regards the species found in



Europe and Northern Asia and the Grizzly Bear of North America as varieties of *Ursus arctos*. He enters into a minute examination and comparison of the external and osteological characters, and gives most minute measurements, in elaborate tables, to support this conclusion; but I think that his not having been able to distinguish the Ant- from the Carrion-Bear (and he figures a skull of each as a subvariety of *Ursus arctos*, var. *beringiana*) must make one cautious in accepting his theory without more examination.

Von Schrenck, in his 'Amurland,' says that the size of the tubercular grinder varies in the Bears of North Asia; but I suspect he also has combined the Carrion-Bear and the Ant-Bear into one species.

a. Old-World Bears. *The fur shaggy. The hind feet elongate. The claws moderate. The palate flat, rather broad.* URSUS.

European Bears, Gray, *Ann. Phil.* 1825.

Old-World Bears (Ursus), Gray, *P. Z. S.* 1864, p. 682.

\* *Fur shaggy, brown, or grey, or whitish.*

### 1. *Ursus arctos*.

Brown or blackish; fur shaggy; hair longer on the withers.

The palate broad. The upper tubercular grinder nearly half as long again as the flesh-tooth.

*Ursus fuscus*, Albert, *Magn. de Anim.* lib. xxii. p. 183.

*Ursus arctos*, Linn. *S. N.* p. 169; Pallas, *Zoogr. Ross.-Asiat.* 1. p. 64; De Blainv. *Ostéogr.* t. 6, t. 7 (adult skull); Gray, *P. Z. S.* 1864, p. 682.

*Ours brun d'Europe*, Cuvier, *Oss. Foss.* iv. p. 332.

*Ursus cadaverinus*, Eversm. *Bull. Soc. Nat. Mosc.* 1840, p. 8, pl. 1. f. 1.

Brown Bear, Pennant, *Arctic Zool.* i. p. 61.

Var. 1. *normalis*. The upper tubercular grinder nearly half as long again as the flesh-tooth. Lower edge of lower jaw straight.

Subvariety a. *scandinavicus*, Gray, *l. c.* p. 682.

B.M.

*Ursus arctos*, Linn. *Fann. Suec.*; Nilsson, *Skand. Fauna*, fig. t. 23 (ring-necked variety).

*Hab.* Sweden.

Nilsson describes six varieties found in Sweden:—1. Black; 2. Dark brown; 3. Brown, washed with white (the *Silfver björn*); 4. Red-brown; 5. Brown, with a white ring on the neck; 6. Variegated or Albino Bear (*l. c.* p. 193).

Subvar. b. *Hidgeedjur*, Worm. *Mus.* p. 318.

*Hab.* Norway.

Subvar. c. *rossicus*. Russian Bear.

*Hab.* Russia.

Subvar. d. *sibiricus*.

*Hab.* Siberia.

Fur in all states and ages brown.



Subvar. *e. meridionalis*, Middendorff, Sibir. Reise, p. 74; Schrenck, Amurland, p. 13.

*Hab.* Caucasus.

Subvar. *f. polonicus*.

Ours brun de Pologne (première variété), Cuvier, *Oss. Foss.* iv. p. 332, t. 22. f. 3; De Blainville, *Ostéogr.* t. 7. f. (adult skull).

Crown of the skull very high over the condyles, and sloping down rapidly behind and before; canines very large, lower edge of lower slightly curved.

Subvar. *g. pyrenaicus*.

Ours brun des Alpes, Buffon, *H. N.* viii. pp. 24, 86, 61; Cuvier, *Oss. Foss.* iv. t. 22. f. 1, 2.

Ours brun des Pyrénées, Cuv. *Oss. Foss.* iv. p. 332.

Ours des Asturies, fem. (*U. arctos*), De Blainv. *Ostéogr.* Ursus, t. 3 (skeleton), t. 7 (skull ♂, adult).

*Ursus arctos*, Schreb. t. (from Buffon).

*Ursus pyrenaicus*, F. Cuv. *Mamm. Lithogr.* xlv. t. (young).

*Ursus arctos pyrenaicus*, Gray, *P. Z. S.* 1864, p. 683.

*Hab.* Pyrenees.

Fur of young yellowish; hairs brown, yellow-tipped; head deep yellowish; feet black.

Subvar. *h. niger*. Fur black-brown.

*Ursus niger*, Albert. Magn. *de Anim.* lib. xxii. p. 183.

*Ursus arctos niger*, Gmelin, *Syst. Nat.* i. p. 100.

Ours noir d'Europe, Daubenton; Cuvier, *Oss. Foss.* iv. p. 333, t. 20. f. 2-5, t. 21. f. 1, 2, 6-8.

*Ursus niger*, F. Cuvier; Fischer, *Syn. Mamm.* p. 143; Keys. & Blasius, *Wirb. Eur.* xix. p. 64.

*Ursus arctos*, var., Nilsson, *Skand. Fauna*.

*Hab.* Europe (Daubenton and Cuvier).

Skulls.	Length of tubercular grinder.		Length of skull.		Width of skull at condyle.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
218 <i>e.</i> Nose above rounded...	in.	1.	in.	1.	in.	1.	in.	1.	in.	1.	in.	1.	in.	1.	in.	1.	in.	1.
218 <i>f.</i> " " "	1	2	13	6	9	8	3	6	4	0	6	10	2	4	4	3	2	2
218 <i>a.</i> Nose flattened above...	1	2½	13	0	8	3	3	0	3	0	7	0	2	1½	4	5	1	10
	1	2½	13	4	9	9	3	2	3	5	7	3	2	5	4	10	1	11

Skull of adult from Sweden. Presented by the Earl of Selkirk. —Like former, 218 *e*, the palate is rather concave; but the hinder part in front of the inner nostril is flat, and the cavity of the inner nostril contracted, with a thick arched front edge, of nearly the same width as the back one. The lower jaw with a long, regularly arched suture. Length of the skull, from the front teeth to the end of the condyle,  $13\frac{3}{4}$  inches; width at back of zygoma

10½ inches, of the nose 3½ inches; the hinder nostrils wide in front (1½ inch) and behind (1½ inch); the length of the suture of the lower jaw 3½ inches.

Skull of adult, of large size.—The nose very broad, swollen, evenly rounded above. The palate rather concave, deeply concave and rather contracted behind, in front of the large hinder opening of the nostrils, which contracts on the sides behind, and with a thin regularly rounded front edge. The front of the chin of the lower jaw rather short, keeled on the suture. Length of the skull, on the inner side, from front teeth to the end of the condyles, 13½ inches; width of the skull at the hinder edge of the zygoma, in a line with the condyles of the lower jaw, 10 inches; width of the nose at the aperture of the vessel in front of the zygoma 3¾ inches; width of the front part of the hinder opening of the nostrils 1½ inch, of hinder part 1 inch. Length of suture of lower jaw 3 inches.

Skull of a nearly adult, collected by Mr. Lloyd in Sweden.—The palate is rather concave in the middle in front, and is raised on a line with the false grinders; it is flat behind, with a thin edge to the broad internal nostril, which has a transverse front edge; the aperture is large, rather wider behind than in front. Lower suture of lower jaw long and regularly curved. Length of skull, from cutting-teeth to end of condyle, 13 inches; width of skull at back of zygoma 9 inches; width of nose 4 inches, of hinder nostrils 1½ inch; width of nose-aperture 2¼ inches, rather wider than high. Length of suture of lower jaw 3 inches; length of grinder 1¼ inch, of all three.

Cuvier, from the examination of two skulls in the Paris Museum, regards the Black Bear of Europe as a distinct species (see Oss. Foss. iv.). Keyserling and Blasius, in 'Die Wirbelthiere Europas,' 1840, separate it from the *U. arctos*, because it has the "last upper grinder shorter than the flesh-tooth," probably misled by Cuvier's figure (Oss. Foss. iv. t. 21. f. 6); but if they had looked at the other figures, they would have seen that the last grinder is represented long, like that of the other European Bears. Blasius, in his 'Naturg. der Säugethiere Deutschlands,' 1857, does not give the *U. niger* as a distinct species; and Nilsson (Scand. Daggdjur, 1847, p. 208) evidently considers it only a variety of *U. arctos*.

*Ursus falciger* of Reichenbach, which is said to have rather falcated claws, is probably from a specimen which had been long kept in confinement without exercise, when the claws lengthen and curve.

Var. 2. *grandis*.

B.M.

The upper tubercular grinder elongate, more than half as long again as the flesh-tooth; lower edge of lower jaw straight. Fur dark red-brown, of uniform length, smooth.

? Græssdjur, *Worm. Mus.* p. 328.

*Ursus arctos*, Fraser, *Cat. Zool. Gard.* (male).

*Ursus arctos grandis*, Gray, *P. Z. S.* 1864, p. 684.

*Hab.* North of Europe. A male, purchased at Hull, living in the Zoological Gardens from 1852 to 1863.



Skull.	Length of tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
218 g. ....	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
	1	4	11	6	7	2	9	2	8	6	3	1	11	3	10	2	7	
	1	4	14	6	9	3	4	3	4	7	5	2	3	4	6	2	1	

Skull of very old animal, with the crown-crests very high.—Nose broad, as broad as the width of the forehead between the orbits, rather flattened above. Forehead concave in the middle, in front and between the orbits. The zygomatic arch very broad and convex. The orbit small, rather oblong, oblique. The palate nearly flat, broad. The tubercular grinders very large, elongate, full half as long again as the flesh-teeth.

This skull is full as large as that of *U. ferox*, but more ventricose; the palate is broad, as in *U. arctos*; but the tubercular grinder is longer, and as long as that of *U. ferox*. I am inclined to regard it as a good species, but wait for further specimens.

In a smaller skull of an adult Bear, sent from Sweden by Mr. Lloyd, the palate is even and rather concave. The hinder aperture of the nostrils is rather wide, scarcely contracted behind, and regularly arched in front, with a slight central tubercle. The length of the skull below, from front teeth to condyle,  $1\frac{3}{4}$  inch, of palate  $6\frac{1}{4}$  inches; width at condyles of lower jaw  $6\frac{1}{2}$  inches, of nose in front of orbit  $2\frac{2}{3}$  inches, of nose-aperture  $1\frac{3}{4}$  inch, higher than wide; length of suture of lower jaw  $2\frac{1}{2}$  inches; length of hinder upper grinder  $1\frac{1}{2}$  inch, rather longer than in the other larger skulls, and much longer than in the skulls of nearly the same size from Norway, where the tooth is only  $1\frac{1}{2}$  inch long; width between orbits  $2\frac{2}{3}$  inches, at back of orbit  $3\frac{2}{3}$  inches.

### Var. 3. *collaris*.

Fur shaggy, hair long, with closer under-fur, black-grey; the legs and feet blacker; the head pale brown; the shoulders often marked with a white oblique streak, making a collar.

*Ursus collaris* (Ours de Sibérie), *F. Cuvier, Mamm. Lithogr.* xliii.

*Ursus arctos collaris*, *Gray, P. Z. S.* 1864, p. 685.

*Ursus arctos*, var. *beringiana* (partly), *Middendorff, Sib. Reise*, i. pp. 53, 74, t. 1. f. 1-4 (skull); *Von Schrenck, Reisen im Amurlande*, i. pp. 11, 13, 16.

*Ursus ferox*, *Temm. Fauna Japon.* (not *Lewis and Clark*).

A Brown Bear from Hakodadi, *Sclater, P. Z. S.* 1864, p. 374.

*Hab.* Kamtschatka and Amurland; Japan, Northern Island; Zool. Gardens.

The French naturalist of the 'Venus' obtained a Brown Bear at Kamtschatka, and carried it alive to Paris; and they considered it like the true *U. arctos* (Baird, *Rep.* p. 221).

This Bear is very unlike the *Ursus arctos* of Sweden, with which alone I have the opportunity of comparing it.



It is only necessary to compare the figures of the two skulls given in the plate of Middendorff, above referred to, to see the distinction between the skulls of the Carrion- and Ant-Bear of Northern Siberia. The Carrion-Bear (*U. collaris*) has a short, broad skull, with a short nose and small, short lower jaw; the Ant-Bear has an elongated, narrow skull, with an elongated nose and a large, strong lower jaw: the lower jaw in the first is three-fifths, in the second five-sevenths the length of the skull.

Var. 4? *stenorostris*.

Nose of the skull produced, attenuated. Lower edge of lower jaw arched.

Ours brun de Pologne (seconde var.), *Cuvier, Oss. Foss.* iv. p. 332, t. 22. f. 4.

Ours brun élané de Pologne, *De Blainv. Ostéogr.* t. 7 (skull).

*Hab.* Europe, Poland.

Only known from a skull in the Paris Museum. It is very different from the other skull from Poland; the nose is much more produced; the crown more evenly convex; the forehead raised more suddenly from the nose; the lower edge of the lower jaw curved, much arched up behind. I have not seen it: it may be only an accidental variety.

## 2. *Ursus lasiotus*.

Black, nose brownish. Ears covered externally with soft and internally with long hairs, forming a projecting tuft. Fur elongate, forming a large tuft on the throat.

*Ursus lasiotus*, *Gray, Ann. & Mag. N. H.* ser. 3. xx. p. 301.

*Ursus piscator*, *Sclater, Proc. Zool. Soc.* 1867, p. 817 (fig. head), not *Pucheran*.

*Hab.* Siberia, Northern.

Dr. Sclater thinks that the Bear here described may be the *Ursus arctos*, var. du Kamschatka, of I. Geoffroy, in the 'Zoology of the Voyage of the Venus,' t. 4, to which M. Pucheran has given the name of *U. piscator*, *Rev. Zool.* 1855, p. 392. One might think that it is very probably the same Bear by the habitat given; but the figure does not represent any of the peculiarities of the Bear as seen living in the Zoological Gardens, and is much more like a figure of the common *Ursus arctos* of Europe, both in form and colouring. Did the artist make his sketch from the European Bear instead of the one found in Siberia? As the description does not point out any of the characters which induced me to regard the living Bear as a distinct species, I am inclined to use the name I described it by.

## 3. *Ursus isabellinus*. (Indian White Bear.) B.M.

Fur dirty white or yellowish; hairs of the back and nape elongated, very soft, curled, of the sides rigid, adpressed; claws short, straight, and blunt; forehead of skull convex over the orbits, separated from the nose; palate flat, rather slender, narrow; the upper

tubercular grinders long, considerably more than half as long again as the flesh-tooth.

*Ursus isabellinus*, *Horsf. Linn. Trans.* xv. p. 332; *Fischer, Syn.*

*Mamm.* p. 143; *Gray, P. Z. S.* 1864, p. 686.

*Ursus arctos albus*, *Gmelin, S. N. i.* p. 100.

*Ours blanc terrestre*, *Buffon, H. N.* viii. p. 248, t. 32.

*Hab.* Nepal, Thibet (called "Ritck" by the Nepalese).

	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbita.		Length of palate.		Width of palate.		Length of nose.		Height of orbita.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
1010 <i>d.</i> ♂ Cashmere, old.....	1	3½	12	6	7	3	12	8	12	6	6	9	2	0	4	3	2	0
1010 <i>c.</i> ♀ Cashmere .....	1	3½	10	6	6	8	12	6	12	7	5	8	1	9	3	7	1	9
1010 <i>e.</i> ♀ Cashmere, young .	1	4	9	9	5	6½	12	0	12	0	5	3½	1	6	3	3	1	6
1010 <i>f.</i> Cashmere .....	1	4	11	6	6	11	12	7	12	9	6	1	1	10½	3	11	1	9

The skull rather short. Nose narrowed, compressed, flat at the top, with a very large nasal aperture, not so wide as the forehead between the orbits. Forehead broad, flat, convex, on a line, at the back edge of the orbit, with a concavity in the middle in front of the orbit; the most convex part of the crown over the condyles. Orbit oblong, oblique, much higher than broad; zygomatic arches regularly convex, more prominent in the middle of their length. Cutting-teeth normal; the outer in both jaws larger, with a lobe; the two front upper false grinders small, first smallest; the hinder upper grinder very large, elongate, much larger than the flesh-tooth. The palate flat, moderately broad, suddenly contracted behind, on a line rather behind the hinder edge of the last tooth; inner nasal apertures moderate, truncated in front, the sides half as long again as the front edge. Lower jaw with a rather large chin and a flat lower edge.

The British Museum received, in 1853, three skulls (*c*, *d*, *e*) of the "White Bear of Cashmere" from Lieut. Abbot, belonging to a male and two females. They all have a rather convex forehead, which is well separated from the nose by a depression in front of the orbits. This depression is much more deep and decided in the females than in the males; in one it forms a deep concavity in the middle of the forehead between the orbits. In one female the crown behind the orbits is flat, short, rhombic, broad; and in the other it is much larger, more oval, and convex. In the male and one female the nose-hole is higher than broad, and in the other female broader and lower. They all have a large elongated upper tubercular grinder.

#### 4. *Ursus syriacus*. (Syrian Bear.)

B.M.

Fur dirty yellowish; the palate narrow, concave; the tubercular grinder very broad, strong, not half as long again as the flesh-tooth;



the forehead flat, nearly on a line with the very broad nose; the aperture of the nose large, broad, as broad as high.

*Ursus syriacus*, *Hempr. & Ehrenb. Symb. Physicæ*, i. t. 1; *Gray*, *P. Z. S.* 1864, p. 687.

*Hab.* Syria, Mount Lebanon (*Ehrenb.*); Persia? (*Fraser*).

This Bear is very like *U. isabellinus* in external appearance; but the form of the skull is very different. The nose is broader, striated, and only separated from the forehead by a very slight depression. The upper tubercular grinder is shorter and thicker than in the generality of the skulls of the Indian White Bears.

The skulls of the adult and half-grown Bears from Syria are very like that from Cashmere of the same age; but the forehead is rather broader and more convex, and it extends further back between the temporal muscles. The nose is considerably broader at the end, being 3 inches and 1 line over the canines, and only separated from the forehead by a very slight depression; while in the male *U. isabellinus* it is only 2 inches and 9 lines wide. The outer maxillæ on the sides of the nasal broad. The lower jaw is stronger and higher, especially at the hinder part. The zygomatic arch is much wider and stronger, especially in the front part under the orbit. The upper tubercular grinder is thicker, but shorter than in the skulls from Cashmere.

Skulls.	Length of tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
1010 <i>b.</i> Zool. Gard.; Syria	1	3	12	9	7	6	3	0	2	8	6	7	1	11	4	1	1	9
1010 <i>a.</i> " " .....	1	2	10	9	6	2	2	4	2	4	5	8	1	9	3	9	1	8

The skins of each of these animals are in the British Museum: *b* is a large whitish animal; *a* is a smaller pale-brown one.

They were both formerly living in the Zoological Gardens.

\*\* *Fur short, close, uniform, deep black.* Asia.

#### 5. *Ursus torquatus*. (Indian Black Bear.) B.M.

Fur black; chin white; a broad, forked, white mark on the chest, rather contracted behind; cheeks with prominent bushy hairs; face brownish; palate of skull narrow, concave; upper tubercular elongate, half as long again as the flesh-tooth.

*Ursus thibetanus*, *F. Cuvier, Mamm. Lithogr.* t.; *Owen, P. C. S. Z. S. i.* p. 76, 1831 (anatomy); *Radde, Mélanges Biologiques de St. Pétersbourg*, iii. p. 677, 1861; *Hodgson, J. A. S. B. i.* p. 340, x. p. 910; *P. Z. S. i.* p. 96; *Calcut. J. N. H.* iv. p. 288; *Swinhoe, P. Z. S.* 1862, p. 351; *Sclater, P. Z. S.* 1867, p. 818; *Radde, Reisen Nord-Ost-Sib. Säugeth.* p. 12.



*Ursus ferox*, *Robinson, Assam*, p. 69.

*Helarctos malayanus*, *Hodgson, J. A. S. B. i.* p. 340.

*Helarctos tibetanus*, *Gray, Cat. Mamm. B. M.* p. 73.

*Ursus torquatus*, *Schinz, Syn. Mamm.* p. 302; *Wagner, Suppl. Schreb.* t. 141 D; *Gray, P. Z. S.* 1864, p. 688.

*Ursus formosanus*, *Swinhoe, P. Z. S.* 1863, p. 380; *Gray, P. Z. S.* 1864, p. 689. B.M.

*Hab.* India, Nepal, central hilly region (*Hodgson*); East Siberia (*Radde*). Not found in Thibet (*Hodgson, J. A. S. B. xi.* p. 282); Formosa (*Swinhoe*).

Skulls.	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
219 <i>b</i> .....	1	3	11	3	6	6½	2	6	2	9	5	8	1	5	3	6	1	6
219 <i>h</i> .....	1	3	11	0	6	6	2	6	2	7	5	9	1	8	3	4	1	5½

The specimen *h*, which has the wider palate, also has a much more convex forehead.

Var. 1. *arboreus*.

Upper tubercular and nose shorter.

*Ursus himalaicus arboreus*, *Oldham, MS. B. M.* (young skull).

*Hab.* Darjeeling (*Oldham, Hodgson*).

The skull has a broad short nose, rounded above; the nose-opening as high as wide; forehead convex, broad, rounded on the sides; nasal bones very broad, large, extending back to a line even with the middle of the orbits; lower edge of lower jaw straight; the last tubercular grinders broad, larger than the flesh-tooth, oblique, truncated on the outer hinder side, not wider than long; palate nearly flat, slightly concave in front, rather contracted behind, on a line with the last edge of the tubercular grinder; hinder opening of the nostrils elongate, scarcely contracted behind, sides longer than the width of the front edge.

Skulls,	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
219 <i>f</i> . <i>Hodgson's</i> .....	1	0½	10	9	6	9	2	6	2	11	5	7	1	7	3	4	1	6
219 <i>g</i> . .....	1	0	9	9	5	11	2	4	2	5	5	3	1	5	2	9	1	6
219 <i>c</i> . <i>Oldham's</i> (young) ...	1	0½	8	6	5	4	2	1	2	4	4	9	1	4	2	6	1	3

Two of these specimens (*g* and *c*) have a much shorter nose than the generality of the skulls of *U. torquatus*; but *f*, which has also a short tubercular grinder, like them has the nose of the skull of the

usual length; they all have rather narrow palates. The forehead of *f* is convex and rounded.

Skull elongate. Nose broad, compressed, the sides shelving above, and flat over the nasals; nasals short, scarcely reaching to the front edge of the orbits. Orbits oblong, ovate, longitudinal. The forehead between the orbits convex, rounded, rather wider than the hinder part of the nose. The crown arched, the most convex part being in front of the condyles. The zygomatic arch narrow, elongate. The palate narrow, deeply concave in front, narrower between the tubercular teeth, narrower behind, with a large elongate opening to the hinder nostrils, which has an arched front edge, and the side more than twice the length of the width of the front edge. The tubercular grinder very large, wide, oblong, as wide and much longer than the flesh-tooth.

As in the other Bears, the skull varies in the width and form of the front edge of the opening of the hinder nostrils, and also a little in the surface of the palate. There is in the Museum a specimen of a young Bear, received from Mr. Oldham under the name of *Ursus hindaicus arboreus*, that has a wide front edge to the hinder nostrils; and the palate in front of the opening is concave, with a slight keel on each side; but we have a skull of a young *Ursus tibetanus*, from Mr. Hodgson, with a similar opening to the hinder nostrils.

#### 6. *Ursus japonicus*.

Black; fur short, dense, polished; hair on sides of neck longer; face black, clothed with short hair; ears large; throat with a slight, undefined whitish line; head short, rounded; muzzle rather short.

*Ursus japonicus*, *Sclater*, *P. Z. S.* 1862, p. 261, pl. 32; *Gray*, *P. Z. S.* 1864, p. 689.

*Ursus tibetanus*, *Temm. Fauna Japon.* p. 29.

*Hab.* Japan (*Vivar. Soc. Zool.*).

#### 7. *Ursus inornatus*.

*Ursus inornatus*, *Pucheran, Rev. et Mag. Zool.* viii. p. 392; *Arch. für Naturg.* 1856, p. 43; *Gray*, *P. Z. S.* 1864, p. 690.

*Hab.* Ceylon. A young specimen.

*b.* Long-clawed American Bears. *The fur shaggy. Front claws much longer than the hinder one, broadly depressed, whitish. The palate narrow and contracted behind. Ears small. Hind feet elongate.* North America. DANIS.

Grizzly American Bears (Danis), *Gray, Ann. of Philosophy*, 1825; *P. Z. S.* 1864, p. 690.

The skull of these Bears more resembles that of the European Bears than that of the short-footed, smooth-haired American Bears; for De Blainville calls the Pacific Grizzly Bear only a variety of *Ursus arctos*.



8. *Ursus* (Danis) *cinereus*.

B.M.

Fur very long, very dense, longer on the neck and occiput, dark brown, with ashy tips.

*Ursus cinereus*, *Desm. Mamm.* p. 165; *Gray, P. Z. S.* 1864, p. 690.

*Ursus griseus*, *Desm. Dict. H. N.* xxiv. p. 266.

*Ursus horribilis*, *Ord, in Isis*, 1819, p. 107; *Say, Long's Exped.*; *Baird, Mamm. N. A.* t. 41, 42 (skull).

*Ursus ferox*, *I. Geoff. Dict. Class. H. N.* xii. p. 521; *Lewis & Clerk, Travels*, i.; *Fischer, Syn. Mamm.* p. 144; *Prinz Max. von Neuwied, Acad. Nat. Cur.* xxvi. p. 33, 1857.

*Ursus arctos*, var., *Middendorff, Sibirische Reise*, ii. 4. p. 54, 1853.

Ours de Californie (*Ursus arctos ferox*), *De Blainv. Ostéogr. Ursus*, t. 2 (skull), t. 6 (skull, old and young).

*Danis ferox*, *Gray, Ann. Philos.* lv.

*Ursus candescens*, *H. Smith.*

L'Ours noir d'Amérique, *Curier, Oss. Foss.* iv. p. 332, t. 23. f. 1, 2.

*Hab.* North America; California (*Douglas*).

"Size very large. Tail shorter than ears. Hair coarse, darkest near the base, with light tips; an erect mane between the shoulders. Feet very large; fore claws twice as long as the hinder ones. A dark dorsal stripe from occiput to tail, and another on each side along the flanks, obscured and nearly concealed by the light tips; interval between the stripes lighter; all the hairs on the body brownish yellow or hoary at tips; region around ears dusky; legs nearly black; muzzle pale, with a dark dorsal stripe."—*Baird, Mamm. N. A., San Francisco.*

Skulls.	Length of upper tubercular.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
1137a. ....	1	5½	14	0	8	6	3	2	3	6½	7	9	2	3½	4	6	2	0
1137b. Douglas's. ....	1	5½	15	0	8	3	3	1	3	7	7	8	1	11½	4	9	2	3

The two skulls vary considerably: the first is much broader, the palate wider, the nose shorter, and the orbit smaller, rounder; the second, from the Rocky Mountains, is narrower, the nose longer, the palate much wider, and the orbit much higher and more oblong.

The lower jaw with a straight lower edge, very slightly bent up behind the chin, and scarcely bent up at the hinder end. The outer lower cutting-teeth larger, and lobed on the outer side. The outer upper cutting-teeth larger, with a lobe on the inner side. The two front upper false grinders very small, far apart; the third larger, three-lobed.

There are two skulls in the Museum collection; they both agree in being narrower than the skull of *U. arctos* of Europe, in having a much larger hinder tubercular grinder, and in having a narrow opening to the hinder nostrils, which are oval at the front edge; the size of the opening differs considerably in the two specimens, being



smaller and narrower in the oldest one. Nasal bones elongate, nearly to a line in middle of orbit. Length of the hinder grinder in all long, about  $1\frac{1}{2}$  inch.

The skull collected by Mr. Douglas and sent to the Zoological Society is  $14\frac{1}{2}$  inches long, from front teeth to end of condyle; palate  $7\frac{1}{2}$  inches long; width at back of zygoma  $8\frac{1}{2}$  inches; width of nose, at aperture of artery,  $3\frac{1}{4}$  inches; length of last grinder  $1\frac{1}{2}$  inch; length of suture of lower jaw  $3\frac{1}{4}$ . The hinder nostrils wide,  $1\frac{1}{4}$  inch in widest part, rather narrower behind; length 3 inches.

The skull of an old specimen that lived many years in the Tower and in the Zoological Gardens, with some of the grinders and the canines worn down.—The internal nostril is narrow, rather wider behind than in front; the front edge ovate. Length of the skull below, from front cutting-teeth to end of condyle, 14 inches, of palate  $7\frac{1}{2}$  inches; width at back of zygoma 10 inches, of nose, at hole for artery,  $3\frac{1}{3}$  inches; length of suture of lower jaw  $3\frac{1}{2}$  inches; width of nose-aperture 2 inches, rather higher than wide.

#### 9. *Ursus* (Danis) *horriaceus*.

B.M.

*Ursus arctos*? (Barren-ground Bear), Richardson, *Fauna Boreali-Americana* (see Baird, *Mamm. N. A.* p. 229).

? *Ursus horribilis*, var. *horriaceus*, Baird, *N. A. Mamm.* t. 80 (skull); *Rep. Mexican Boundary*.

*Hab.* New Mexico, Sonora.

This Bear, according to Sir John Richardson, exhibits peculiarities not found in the Grizzly Bear of the Pacific Coast. Dr. Spencer Baird's figure represents a *Myrmarcos*.—Gray, *P. Z. S.* 1864, p. 691.

*Ursus horribilis*, var. *horriaceus*, Baird, *Mexican Mamm.* p. 24 (*Sonora Grizzly Bear*) is less than the Grizzly Bear of the Pacific Coast. Head very broad; ears and tail nearly equal; fore claws twice as long as the hinder ones. General colour dark brownish, with the tips of the hairs much lighter, of a dirty amber-colour; no distinct indications of dark stripes on back and sides.

*Hab.* Los Nogales (*Dr. Kennerly*).

c. Short-clawed American Bears. *Fur short, uniform. Front claws moderate, not much longer than the hind ones. Hind feet short. Upper tubercular moderately long, narrowed behind.* EUARCTOS.—Gray, *P. Z. S.* 1864, p. 691.

American Bear, Gray, *Ann. Phil.* 1825.

#### 10. *Ursus* (Euarctos) *americanus*.

B.M.

Fur entirely uniform throughout, either black or brownish; hair darkest towards the tips; nose brown; feet moderate; fore claws not twice as long as the hinder.

*Ursus americanus*, Pallas, *Spic. Zool.*; Schreb. *Säugeth.* t. 141. f. B.

Ours (noir) d'Amérique (*U. americanus*), Cuvier, *Ménag. Mus.*; *Ann.*

*Mus.* vii. p. 333, t. 18. f. 7, t. 21. f. 1-3; *Oss. Foss.* v. p. 318, t. 22. f. 5, 6, t. 23. f. 1; *F. Cuvier*, *Mamm. Lithogr.* t.; *Fischer*, *Syn. Mamm.* p. 145; *Baird*, *Mamm. N. A.* p. 225, t. 43. f. 10-13 (skull); *Gray*, *Cat. Mamm. B. M.* p. 72; *De Blainv. Ostéogr.* *Ursus*, p. 20, t. 5 (skull of adult and young), t. 11 (bones), t. 12 (teeth); *P. Z. S.* 1859, p. 477; 1860, pp. 130, 180, 417; *Gray*, *P. Z. S.* 1864, p. 692.

*Ursus niger americanus*, *Schinz*, *Syn. Mamm.* p. 301.

*Ours gulaire*, *I. Geoff.* *Mus. Paris.*

Black Bear, Penn.

*Hab.* North America.

Mr. Bartlett notices the two hybrids, believed to be from a male *Ursus americanus* and a female *U. arctos* (*P. Z. S.* 1860, p. 130).

The series of skulls of North-American Bears in the British Museum offers a very considerable amount of variation: in some the nose and forehead are nearly on the same plane; that is to say, there is very little depression in front of the orbits; but in others the depression is more decided; and in the skull of the Cinnamon Bear it is as great as in the usual form of the European Bears. The greater number of the skulls have the forehead and front of the crown more or less convex, sometimes decidedly so; but in a few the forehead is nearly flat.

Skulls.	Length of upper tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
217 c. ....	1	1	10	6	6	9	2	5	2	11	5	8	1	7	3	3	1	5
217 k. ....	0	11	10	6	6	5	2	3	2	7	5	6	1	8	3	7	1	1
217 l. ....	1	0	9	3	5	4	2	0	2	14	11	1	6	3	0	1	3	

The specimens *k* and *l* have the opening for the vessel of the palate in front of the front edge of the upper tubercular tooth. In a skull (*i*) in the British Museum it is opposite the middle of the tubercular on one side, and opposite the front edge on the other. The specimen *k* is from the western slope of the rocky mountains (*Lord*).

The skull elongate. Nose rather produced, compressed on the sides, rounded above; nasal bones long, of the same length as the upper part of the maxillæ, and extending to a line level with the middle of the orbits. Forehead convex, rounded, rather shelving on the sides. The nose-aperture higher than broad, oblique. Orbits small, oblong, longer than high. The zygomatic arch moderately strong. The palate rather contracted at the line of the last tooth, and more so behind towards the inner nasal opening, which is rather narrow, with a transverse front edge, and with the sides considerably longer than the width of the front edge. The tubercular grinder large, broad, considerably longer than the flesh-tooth. The outer cutting-teeth largest, lobed. The front false grinders small, subequal, far apart.

There is an adult skull in the Museum, received from the Zoolo-



gical Society as the skull of a Bear said to have come from North America. It is very like the other specimens of *U. americanus*; but the nasal bones are shorter, and do not extend so far up the nose as in the other specimens, stopping nearly a third of an inch short of the upper hinder angle of the maxillary bones. The palate also is rather more concave. The length of the skull is 11 inches, of the palate  $5\frac{3}{4}$  inches, of tubercular grinder  $1\frac{1}{12}$  inch; width of zygoma  $6\frac{1}{8}$ , of nose  $2\frac{1}{2}$ , of forehead between the orbits  $2\frac{5}{12}$ .

### 11. *Ursus* (*Euarctos*) *cinnamomeus*.

B.M.

*Ursus luteolus*, *H. Smith, Griffith's A. K.*

*Ursus americanus cinnamomeus*?, *Baird, Mamm. N. A. t. 79* (skull).

Small Brown Bear from the copper-mines of New Mexico, *Baird, Mamm. N. A. pp. 217, 228.*

*Ursus cinnamomeus*, *Baird, Mex. Mamm. p. 29; Gray, P. Z. S. 1864, p. 693.*

*Ursus americanus cinnamomeus*, *Bachm. N. A. Journ. ii. t. 127, 1853?*

"Size equal to or less than that of the Black Bear. Colour varies in different shades of brown, very rarely black. Skull broader than in the common Black Bear" (*Baird*).

The skull of an adult Cinnamon Bear in the Museum agrees with the skulls of the other North-American Bears in most particulars; but the orbit is oblong, oblique, much narrower from before backwards than in the common *U. americanus*, and the tubercular grinders longer and broader. The palate is concave, and the hinder aperture of the nose with an arched front edge. The nasals are broad, extending up as far as the maxilla, and in a line with the middle of the orbits. The lower jaw is not so high. The length of the skull  $9\frac{3}{4}$  inches, of the palate  $5\frac{3}{12}$  inches, of the tubercular grinder  $1\frac{6}{12}$  inch; width at zygoma  $6\frac{1}{2}$  inches, of nose  $2\frac{4}{12}$  inches, of forehead between the eyes  $2\frac{1}{2}$  inches.

*Ursus amblyceps* (*Baird, MS.*). "The skull shows conclusively a different species from the American Bear of the eastern States" (*Baird, l. c. p. 217*).

### 3. MYRMARCTOS. (Ant-Bear.)

Head elongate, narrow. Lips moderately extensile. The skull flat above, the nose, forehead, and front of the crown forming a regular shelving line; brain-case compressed. The nose moderate, flat above, compressed on the sides. The forehead narrow; the space between the orbits narrower than the nose. The last grinder moderate, longer than the flesh-tooth. Palate deeply concave; the hinder nasal aperture large, broad; the sides longer than the width of the front edge. Lower jaw large, elongate.

*Myrmarctos*, *Gray, P. Z. S. 1864, p. 694.*

The Ant-Bears seem to have been long known, but somehow most unaccountably overlooked. They are evidently very distinct from the carrion or omnivorous Bears (*Ursus*).

Worm (*Mus. p. 318*) mentions three Bears as inhabiting Norway: 1. the Brown Bear, which is called *Græssdjur* (Herb-Bear), the



largest and most dangerous, living principally on vegetables; 2. the Black Bear or *Ildgiesdjur*, the most carnivorous, attacking horses; 3. the Ant-Bear or *Myrelbjorn*, the smallest, but still dangerous (see Cuvier, Oss. Foss. iv. p. 313).

Pallas, in 'Zoographia Rosso-Asiatica,' observes, "Rossi distinctionem faciunt Ursorum inter *formicarios* (*Muraveniki*) et *cadaverivoros* (*Sterveniki*), sed nullo solido argumento: variant solummodo colore vel nigriore, vel e fusco magis rufescente; et magis minusve iracundi et crudeles fiunt anni tempore, ætate et alimenti copia vel inopia."

Dr. Edward Eversmann, in the 'Bulletin de la Soc. Imp. des Nat. de Moscou' for 1840, p. 8, says that in the east of Moscow there are two kinds of Bear, one the *Aasbären* (*Sterveniki*), or Carrion-Bears, and the other the *Ameisenbären* (*Muraveniki*), or Ant-Bears; and he gives the characters which distinguish them, and figures the skulls of the two species. He states, "In the Ant-eating Bear the skull is more elegantly formed. The anterior level of the frontal bone forms a plane with the nasal bone; the forehead also does not stand forwards, and forms no depression, but is flat. The molar teeth are narrower and longer; the zygomatic arch is thinner and more slender; altogether the entire skull is proportionally longer, not so high, and not so robust as in the carrion-eater (*Ursus arctos*)."

1. *U. cadaverinus* (= *U. arctos*, Linn.). Fronte supra oculos convexa, rostro abrupte attenuato brevi; vellere fusco, regione humerorum colloque pallidioribus; pedibus nigris (t. 1. f. 1, skull). Called "*Sterveniki*."

2. *U. formicarius* (= *U. longirostris*). Fronte plana, modice in rostrum attenuata; vellere flavicanti-fusco, pilis apice flavidis ceterum fuscis; pedibus nigris (t. 1. f. 2, skull). Called "*Muraveniki*."

### 1. *Myrmarctos Eversmanni*.

B.M.

Myrebiorn, *Worm, Mus.* p. 308.

Muraveniki, *Pallas, Zoogr. Rosso-Asiat.*

*Ursus formicarius* (*U. longirostris*), *Eversmann, Bull. Soc. Imp. Nat. Mosc.* 1840, p. 8, t. 1. f. 2 (skull); *Bonap. Mamm. Eur.* p. 11.

*Ursus arctos*, var. *beringiana* (partly), *Middendorff, Sib. Reise*, i. p. 53, t. 1. f. 5, 6 (skull).

*Myrmarctos Eversmanni*, *Gray, P. Z. S.* 1864, p. 695.

? Young or var., white-collared.

*Ursus norvegicus*, *F. Cuv. Mamm. Lithogr.* vii. t.; *Fischer, Syn. Mamm.* p. 142.

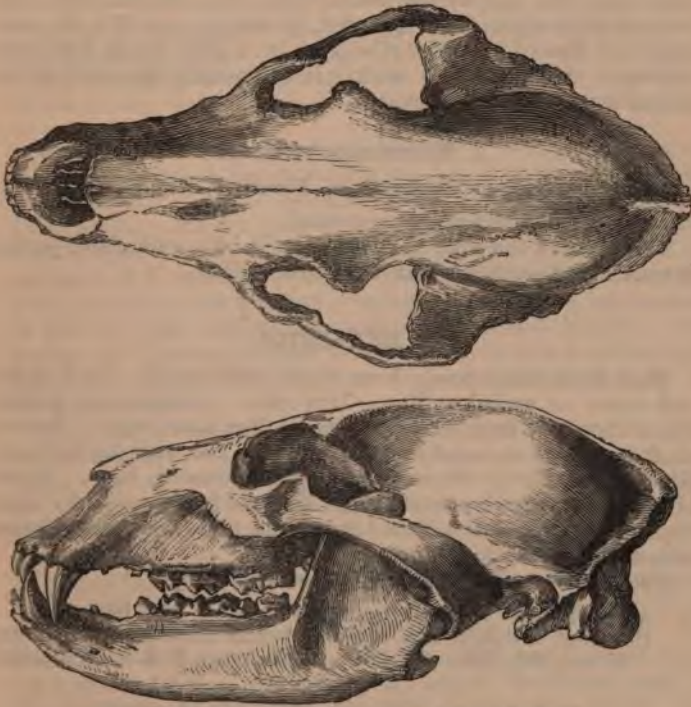
? Ours brun de Norvège, *De Blainv. Ostéogr.* t. 7 (skull of young).

*Hab.* Norway (skeleton, B.M.).

Skull.	Length of upper tubercular.	Length of skull.	Width of skull.	Width of nose.	Width at orbits.	Length of palate.	Width of palate.	Length of nose.	Height of orbit.
218c. Brandt .....	in. 1. 1 11/3	in. 11 3/6	in. 3 1/2	in. 6 2/6	in. 2 1/2	in. 10 1/10	in. 9 3/10	in. 9 1/10	in. 7 1/10

Skull of nearly adult Bear from Norway. The palate is very concave, especially in the middle of its length, in a line with the first large false molar; the hinder edge rather concave, and smoothed behind, near the front edge of the internal nostrils, which is thin and regularly arched; the aperture of the hinder nostril large, rather broader in front than behind. The hinder tubercular grinder rather short. Forehead quite flat, produced behind to a line over the ears, not convex above the orbits, narrow between the orbits. Nose broad, flat at tip; nasal bones only extending to rather behind the front edge of the orbit, not nearly so far as in *U. arctos* of Sweden. The aperture for the passage of the artery to the palate in a line with

Fig. 30.

Skull of *Myrmarctos Eversmanni*, from Norway.

the front edge of the hinder grinder. Length of the skull below  $11\frac{1}{4}$  inches, of palate  $5\frac{3}{4}$  inches; width at condyle of lower jaw  $6\frac{1}{2}$  inches, of nose behind, at aperture  $2\frac{2}{3}$ , at canines  $2\frac{1}{3}$ , of nose-aperture  $1\frac{2}{3}$  inch, between orbits  $2\frac{1}{4}$  inch, at back of orbits  $3\frac{1}{2}$  inches.

I think that the skeleton which is in the British Museum, which was received from Mr. Brandt of Hamburg as that of a Bear from



Norway, and named *U. norvegicus*, is the *Myrebiorn* or Ant-Bear of Worm.

I am not so sure that it is the Ant-Bear of Eastern Siberia, figured by Eversmann as *U. formicarius*, as the figure of the skull does not quite agree with the Museum specimen: the flat plane of the forehead is not carried so far back on the crown as in the skull here described. If it is not the same, the *U. formicarius* of Siberia must be, from the description, a nearly allied species of the same genus.

The figure of the skull of the young Brown Bear from Norway, figured by De Blainville (*Ostéogr.* t. 7), is probably a young skull of this species: it differs from the figures of the skull of the other European Bears in the same work, in the forehead not being separated from the nose by any frontal cross line. De Blainville does not give an account of its origin, but, by mistake, says it is the same as the one figured by Cuvier (*Oss. Foss.* iv. t. 22); but no skull from Norway is figured in that work. It is probably the skull of the animal figured by M. F. Cuvier.

## 2. *Myrmarcos horriaceus*.

*Ursus horribilis horriaceus*, Baird, *Mamm. N. A.* t. 80. f. (skull).

*Hab.* North America, barren ground.

The figure of the skull in Dr. Spencer Baird's work above quoted is more like *Myrmarcos* than *Ursus* (see p. 229).

## 4. *HELARCTOS*.

Head short, subglobose. Nose short, forming with the forehead and crown an arched outline. Lips rather external, very mobile. Front claw very long, strongly arched. Fur short, rigid. Nose of skull very short, as broad as long, forming a line with the forehead. Nasal bones short. Front false grinders crowded, large. Upper hinder grinder broad, scarcely larger than the flesh-tooth; the outer upper cutting-teeth much the largest; the first false grinder large, second very small, third two-lobed.

*Hab.* Southern Asia, South America, and Europe.

Asiatic Bears (*Prochilus*) (partly), Gray, *Ann. Phil.* 1825.

*Helarctos*, Horsfield, *Zool. Journ.* ii. p. 221, 1825; *Féruss. Bull. Sci.* N. vi. p. 396, 1825; *Isis*, 1830, p. 1023; Gray, *P. Z. S.* 1864, p. 696.

a. *Australasian.* Claws compressed, much curved.

### 1. *Helarctos malayanus*. (The Bruang.) B.M.

Black; nose ferruginous; chest with a semilunar or semioval yellow patch; claws very long.

*Ursus malayanus*, Raffles, *Linn. Trans.* xiii. p. 254; *Horsf. Java*, t. ; *F. Cuvier, Mamm. Lithogr.* t. ; *Cuvier, Oss. Foss.* iv. p. 322, t. 22. f. 3, 4; *De Blainv. Ostéogr.* *Ursus*, p. 25, t. 8 (skull), t. 12 (teeth); *Fischer, Syn. Mamm.* p. 144.



*Prochilus malayanus*, *Gray, Ann. Phil.* 1825, p. 61.

*Helaretos malayanus*, *Horsf. Zool. Journ.* ii. p. 221, t. 7; *Gray, Cat. Mamm. B. M.* p. 73; *P. Z. S.* 1864, p. 697.

*Helarctos euryaspilus*, *Horsf. Zool. Journ.* ii. p. 221, t. 7; *Gray, Cat. Mamm. B. M.* p. 73.

Malay Bear, *Griffith, A. K.* t.

*Hab.* Malayan islands—Sumatra, Borneo, Java; Malay peninsula. Called "*Bruang*" by Malays.

Skulls.	Length of tubercular grinder.		Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
1140a. <i>E. (H.) euryaspilus</i> .....	0	10	8	3	6	5	2	4	2	5	4	6	1	1	2	7	1	3
1140b. Borneo (younger) .....	0	9	7	6	6	3	2	4	2	0	4	0	1	2	3	1	0	
959a. <i>H. malayanus</i> (very old)	0	8	8	7	7	0	2	8	2	9	4	4	1	8	2	6	1	1

The skull of a very old animal, labelled *U. malayanus*, received from the Zoological Society's Museum, has a much shorter tubercular grinder than any of the others in the Museum, which are called *U. euryaspilus*; but the teeth of the specimen rather differ in size, and the figure that Cuvier and De Blainville give of the skull of the specimen of *U. malayanus* which we sent to Paris by Dr. Leach, from the species that was first described, appears to be intermediate in size and form between the skulls in the British Museum. But perhaps the Bornean specimen may be found to have a rather larger tubercular grinder which is more contracted behind than in the Javan specimens.

Skull short, swollen. Nose very short, broad; end as broad as the forehead between the orbits; nose-opening elongate, higher than broad. Orbits small, ovate. Forehead broad, convex, arched on the sides and extended far back between the temporal muscles. The palate broad, short, concave, with parallel sides, contracted behind; the opening of the hinder nostrils broad, equal, the sides about as long as the width of the front edge. The last tubercular grinder moderate, broad, as broad and rather longer than the flesh-tooth, obliquely truncated on the hinder half of the outer margin. The side cutting-teeth larger-lobed. False grinders close together, forming a crowded series: the first oblong, longer; the second small, on the outer side of the series; the third longer, three-lobed. The lower jaw short, stout, with a rather long chin and straight lower edge. The nasals are short, and broad at the end, reaching to a line level with the middle of the orbit.

b. *European.* Claws — ?

## 2. *Helarctos euryrhinus.*

Fur dark brown.

*Ursus euryrhinus*, Nilsson, *Skand. Däggdjur*, p. 212.

*Hab.* Hungary (*Mus. Acad. Lund.*).

Professor Nilsson notices a species of Bear (which he saw in the Academical Museum at Lund, said to have come from Hungary; the fur is coloured like *U. arctos*) under the name of *U. euryrhinus* (*Skand. Däggdjur*, p. 212), which is thus characterized:—

"The length of the nose (reckoned from the foramen infraorbitale to the anterior margin of the intermaxillary bones at the suture) is equal to the breadth of the nose, taken either at the foramen infraorbitale or over the roots of the canine teeth."

c. *African.* Claws straight.

### 3. *Helarctos*? *Crowtheri*.

Fur long, shaggy, blackish brown, beneath orange-rufous; nose very short, acuminate, black; toes short; claws stout.

*Ursus arctos*, Shaw, *Barbary*.

Ours en Afrique, Cuvier, *Oss. Foss.* iv. p. 325.

Bear of Mount Atlas, Blyth, *P. Z. S.* 1841, p. 65; *Wieg. Arch.* 1842, p. 27.

*Ursus Crowtheri*, Schinz, *Syn. Mamm.* p. 302.

*Helarctos*? *Crowtheri*, Gray, *P. Z. S.* 1864, p. 698.

*Hab.* North-west Africa; on mountains, Morocco; Tetuan.

"Adult female, inferior in size to that of the American Black Bear; more robustly formed; the face much shorter and broader, though the muzzle is pointed; toes and claws remarkably short; the claws particularly stout. Hair black (rather, brownish black) and shaggy; the under parts of an orange-rufous colour; muzzle black. Feeds on roots, acorns, and fruit; does not climb with facility, and is stated to be very different-looking from any other Bear."

d. *American.* Front claws —.

### 4. *Helarctos ornatus*.

B.M.

Fur black; the nose short, and a semicircle over each eye fulvous; jaws, cheeks, throat, and chest white. Length  $3\frac{1}{2}$  feet.

"Upper hinder grinder broad, not much longer than the flesh-tooth, suddenly contracted behind."

Bear, Condamine, *Voy. Pérou*.

*Ursus ornatus*, F. Cuvier, *Mamm. Lithogr.* t.; *Proc. Zool. Soc.* 1833, p. 114; Fischer, *Syn. Mamm.* p. 143.

Ours des Cordillères (*U. ornatus*), De Blainv. *Ostéogr.* *Ursus*, t. 4 (skeleton), t. 8 (skull), t. 12 (teeth) (of F. Cuvier's specimen).

*Helarctos ornatus*, Gray, *P. Z. S.* 1864, p. 698.

*Hab.* South America, Cordilleras (*Cat. Mus. Zool. Soc.* ii. p. 184).

M. de Blainville describes the skull as being so like that of *H. malayanus* that at first he thought they were the same; but on more careful comparison he found the bones of the nose rather broader proportionally, the mastoid processes rather unlike and nearer to-



gether, the pterygoid processes rather more rounded and recurved, the palatine edge less deeply cut in trefoil, the zygomatic arches broader and more arched, &c.

The other parts of the skeleton present more essential differences (De Blainv. *Ostéogr.* p. 26).

- C. Honey-Bears. Soles of the feet bald, callous; the underside of the base of the toes bald. Cutting-teeth  $\frac{3}{4}$ . Nose subcylindrical, truncated; nostrils large, covered with a large upper flap. Lips very extensile. Front of the palate of the skull bent up.

### 5. MELURSUS.

Head elongate. Nose produced, subcylindrical, truncated. Lips very large, extensile, and mobile. Nostril large, with a larger upper lid. Forehead convex, arched. Ears tufted, exposed. Fur very long, flaccid, with a pendent cervical mane. Claws elongate.

Skull elongated. Nose longer than broad. Forehead rather convex, separated from the nose by a cross line. Palate broad, concave, flat, and bent up in front. Chin high, regularly produced below. Two central upper cutting-teeth abortive.

Asiatic Bears (*Prochilus*) (partly), *Gray, Ann. Phil.* 1825.

*Melursus*, *Meyer*; *Gray, P. Z. S.* 1864, p. 699.

"They never have more than four incisors in the upper jaw. This is the case even in the crania which have the milk-teeth just giving way to the adult ones. They feed on the black ant, termites, beetles, fruits, and particularly the seeds of *Cassia fistula*, of the date-tree, and honey. When pursued, they carry their cubs on their backs, even when chased for nearly three miles. They are said to have lived in captivity for forty years."—*Elliot, Madr. Journ. of Literature and Science*, 1840, p. 9.

#### *Melursus labiatus*. (The Aswail.)

B.M.

Fur very long, flaccid, nape maned; chest with a white cross band; ears very hairy, prominent.

*Ursus labiatus*, *Desm. Mamm.* p. 166; *Fischer, Syn. Mamm.* p. 144; *Hodgson, J. A. S. B.* i. p. 349, x. p. 910; *P. Z. S.* 1834, p. 9; *Calcutta J. N. H.* iv. p. 288; *Tickell, Calc. Journ. N. H.* ii. t. 7; *De Blainv. Bull. Soc. Philom.* 1817, p. 74; *Ostéogr.* *Ursus*, p. 23, t. 8 (skull), t. 11 (bones); *Cuvier, Oss. Foss.* iv. p. 320, t. 23, f. 6.

*Ursus longirostris*, *Tiedem. Abhandl.* 1820, p. 4 (not *Eversmann*); *Reichenbach, Nov. Act. Nat. Cur.* xiii. p. 323, t. 15.

*Bradypus ursinus*, *Shaw, Zool.* i. p. 159, t. 47.

*Bradypus ursiformis*, *Shaw, Nat. Misc.* i. t. 58; *Horsf. Cat. Mus. E. I. Comp.* p. 124; *Cat. Hodgson Coll. B. M.* p. 13; *Wolf, Abbild.* ii. p. 18, t. 7.

*Melursus lybius*, *Meyer*; *Gray, Cat. Mamm. B. M.* p. 73.

*Prochilus ursinus*, *Illiger, Prodr.*

*Prochilus labiatus*, *Gray, Ann. Philos.* 1825, p. 60.

Slow Bear, *Hamilton, Mysore*, ii. p. 197; *Bewick, Quad.*



Ursiform Sloth, *Pennant, Quad. ii. p. 243, t. 92.*

Petre Bear, *Canton, Figures of Animals, t.*

Ours Jongleur, *F. Cuv. Mamm. Lithog. t.; Cuvier, Oss. Foss. iv p. 320, t. 23. f. 6: Delamétherie, Journ. de Phys. 1792, t. 136. f. 1.*

*Hab.* India, plains (*Sykes*); Southern Mahratta country (*Elliot*); Nepaul (*Hodgson*); Benares (*Pennant*); Dukhun.

Skulls.	Length of upper tubercular.	Length of skull.		Width of skull.		Width of nose.		Width at orbits.		Length of palate.		Width of palate.		Length of nose.		Height of orbit.	
		in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
220 <i>h.</i> .....	0 8½	11	6	7	3	2	6	2	6	6	4½	2	5	3	6	1	8
220 <i>b.</i> .....	lost.	12	0	7	3	2	6	2	6½	6	6	2	2	3	6	1	7
220 <i>l.</i> Very old .	0 10	12	6	8	3	2	9½	3	0	6	9	2	5	4	0	1	8
220 <i>c.</i> .....	lost.	12	0	7	10	2	8	2	9½	6	6	2	4	3	8	1	10
220 <i>f.</i> .....	{ 0 9 r. } { 0 10½ l. }	12	0?	7	7	2	9	2	10½	6	8	2	6	3	9	1	8
220 <i>e.</i> .....	0 10	11	0?	7	3½	2	6	2	7	6	3						
220 <i>d.</i> .....	0 9	11	0	6	10	2	6½	2	6½	6	3						
220 <i>k.</i> .....	0 8¾	12	0	7	0	2	9½	2	7	6	7						

Skull:—Nose broad, rather flattened above, rather wider than the forehead between the orbits; nasal opening broader than high. Forehead rounded, regularly sloping down before and behind. Orbits oblong-ovate. The chin very long, sloping; the lower edge of lower jaw straight. The upper cutting-teeth four; the inner ones absorbed; the outer on each side larger. The last upper grinder oblong, almost as long as and narrower than the upper flesh-tooth. The palate broad, concave, bent up in front of the canine, broader behind, especially in the line of the hinder grinder, rather contracted behind towards the hinder aperture of the nostrils. The nose-aperture broad, with a thin transverse edge; the sides not quite as long as the width of the aperture. The zygomatic arches most prominent at the hinder end, rather in front of a line with the condyles.

## Fam. 2. NASUIDÆ.

Nose elongated, produced, truncated; the underside rounded, rather bald, without any central longitudinal groove. Body and limbs moderate. Tail elongate, hairy, black-ringed. Teeth 40.

### NASUA.

Head elongate, tapering. Nose elongate, produced; underside rounded, without any groove. Nostrils in front of the muffle, and reaching only halfway along its sides; upper surface of muffle twice

as long as broad, and ending forwards in a cartilaginous snout (*Baird*). Ears short, rounded. Toes 5.5. Claws strong, acute. Tail elongate.

Skull elongate. Nose produced, compressed. Teeth 40. Cutting-teeth moderate; outer ones elongate, conical; four central upper in an arched line, rather in front of the lateral teeth; lower shelving out in front. Canines large; the lower strong, sharp-edged behind; the upper compressed, conical, and bent out at the ends. Grinders  $\frac{6}{6} \cdot \frac{6}{6}$ ; the three front conical, compressed; the fourth like the flesh-tooth. The tubercular triangular, similar to the flesh-tooth. Lower jaw without any prominent angle behind.

*Nasua*, *Storr.*; *Gray*, *P. Z. S.* 1864, p. 701.

*Coati*, *Lacépède*.

### 1. *Nasua rufa*.

B.M.

Fur fulvous; back darker; sides of nose and head ashy; tail fulvous and black-ringed.

*Viverra nasua*, *Linn. S. N.* i. p. 64; *Schreb. Säuegeth.* t. 118.

*Ursus nasua*, *Cuvier, Tab. Elém.* p. 113, 1798.

*Nasua rufa*, *Desm. Mamm.* p. 170; *Gray, Cat. Mamm. B. M.* p. 74; *P. Z. S.* 1864, p. 701.

*Nasua socialis*, var., *Pr. Max. Beitr.* ii. p. 283.

*Nasua socialis* or *N. rufa*, *Fischer, Syn. Mamm.* p. 148.

*Coatimonde*, *Perr. Anim.* ii. p. 15, t. 37; *Shaw, Zool.* i. p. 385.

*Coati noirâtre*, *Buffon, H. N.*

*Coati roux*, *Cuvier, Règ. An.* i. p. 144; *F. Cuvier, Mamm. Lithogr.* t.

*Brazilian Weasel*, *Penn. Syn.* p. 229, t. 22, f. 1.

*Coati*, *Marcgr. Brazil*, p. 228.

*Myrmecophaga annulata*, *Desm. Mamm.* (from *Krusenstern's Voy.* t.); *Griffith, A. K.* t. (figure altered).

*Myrmecophaga striata*, *Shaw, Zool.* i. p. 51, 1786.

*Tamandua* —, *Buffon, H. N. Supp.* iii. t. 56.

Mr. Turner (*P. Z. S.* 1851, p. 218) professes to have rediscovered the fact (though it is stated in the 'Catalogue of the Mammalia in the British Museum,' p. 74, 1843) that *Krusenstern's M. annulata* is only a *Coati-mondi*; but he is puzzled to explain the figure in *Griffith's 'Animal Kingdom.'* This figure is engraved from a drawing of Major Hamilton Smith's, no doubt copied from *Krusenstern's* figure, but altered and improved, as was his habit when making his very large collection of drawings—a bad habit, that has rendered them of comparatively small value for scientific purposes, as it is impossible to determine whether they are from a figure or a specimen.

### 2. *Nasua narica*.

B.M.

Fur blackish brown, beneath yellowish; head ashy; tail black and yellow, obscurely ringed. The sides of the nose are sometimes marked with a black and white streak.

*Viverra narica*, *Linn. S. N.* i. p. 64; *Schreb. Säuegeth.* t. 119.

*Ursus narica*, *Cuvier, Tab. Elém.* p. 113, 1798.

*Viverra quasie*, *Gmelin, S. N.* i. p. 87.



- Nasua quassie*, Geoff. Mus. Paris.  
*Nasua leucorypha*, Tschudi, Arch. für Naturg.  
 ? *Nasua nocturna*, Pr. Max. Beitr. ii. p. 298.  
*Nasua obfuscata*, Illiger, Prodr.  
*Nasua mondie*, Illiger, Prodr.  
*Nasua fusca*, Desm. Mamm. p. 170; P. Z. S. 1859, p. 435; 1860, pp. 243, 333.  
 ? *Nasua solitaria*, Pr. Max. Beitr. ii. p. 299.  
*Nasua socialis fusca*, Fischer, Syn. Mamm. p. 149.  
*Nasua narica*, Gray, Cat. Mamm. B. M. p. 74; P. Z. S. 1864, p. 702.  
*Coati brun*, Cuvier, Règne Anim. i. p. 444; F. Cuvier, Mamm. Lithogr. t.; Buffon, H. N. viii. t. 48, 49.  
 Dusky Brazilian Weasel, Penn. Syn. p. 330.  
*Couati*, Azara, Essai, i. p. 334.  
*Meles surinamensis*, Brisson, Règne Anim. p. 255.  
*Narica*, Linn. Act. Holm. 1768, p. 152, t.  
 Le Coati noirâtre, Buffon, H. N. viii. t. 47.

*Hab.* Surinam (J. H. Lance).

I have examined with care a series of skulls which are said to have belonged to these two species, but have been unable to discover any characters by which the skulls belonging to one species can be distinguished from those belonging to the other. The skulls of animals of each species vary considerably in the breadth and flatness or convexity of the palate, in the form of the palate behind near the hinder nasal aperture, and in the length of the line occupied by the upper canines and grinders.

In most of the specimens of *N. rufa* and *N. narica* the upper canine teeth and the grinders occupy a line of  $1\frac{5}{8}$  inch; but in two large skulls, with very strong occipital ridges and expanded zygomatic arches, the teeth occupy a line rather more than 2 inches long; in another large skull, with the occipital ridge less developed, and the zygomatic arches less prominent, they occupy the same length: the skulls are each 5 inches long; and one is  $3\frac{3}{4}$ , the other  $3\frac{1}{4}$ , and the last 3 inches wide. But I can find no other characters to separate them, nor can I find any young specimens having similar characters.

If I had only two or three skulls, I might have perhaps seen differences which I might have regarded as distinctions; but when a series of some twenty or more are examined, it is impossible to define any distinction.

### 3. *Nasua dorsalis*.

B.M.

Fur red-brown; under-fur dull brown, longer hairs thin, pale, with thick red-brown tips; chin, throat, and chest whitish; face pale, blackish-grizzled; feet and broad streak on hinder half of the back black; tail blackish, with irregular interrupted grey rings.

*Nasua dorsalis*, Gray, P. Z. S. 1866, p. 169, t. 17.

*Hab.* South America.

The skull is imperfect, the face with the teeth only having been preserved. The face resembles that of the skull of *Nasua narica* in the Museum Collection, no. 225 a (the measurement of which is



given in my paper on *Ursidæ*, P. Z. S. 1864, p. 703), in having a long narrow compressed nose and elongated canine teeth. It differs from the skull of *N. narica* in the upper jaw being rather shorter from the middle of the cutting-teeth to the end of the last molar, and rather wide at the hinder part at the sides of the hinder molars, and rather narrower at the end of the nose. The upper cutting-teeth are narrower; that is to say, the space occupied by the series is considerably narrower than the space they occupy in the skull of *N. narica* above referred to. These may all be mere individual peculiarities, since the skulls of the different specimens of *Nasua* in the Museum, as I observed in the article on *Ursidæ* above quoted, are very variable.

Skulls.	Length of skull.	Width of skull.	Length of nose.	Width of nose.	Length of palate.	Width of palate.	Length of tooth-line.
	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.
<i>N. narica</i> . 225g. Aged .....	5 1	3 4	1 10	1 0	3 3	0 11	2 0
225h. Aged .....	5 0	3 5	1 11½	1 0½	3 3	0 11	2 0½
225a. Aged .....	5 0	3 0	1 11½	0 11	3 2½	0 9	2 1
225i. Adult.....	4 9	2 9	1 9	1 0	3 0	0 10	1 10
225j. ....	4 9	2 8	1 8	1 0	3 1	0 9	1 9½
225f. Skull B.M. ....	4 6	2 5	1 8	0 11	2 11½	0 9	1 9
<i>N. rufa</i> ... 224a. Adult.....	4 8?	2 6	1 7	0 11	3 0	0 9½	1 10
224b. ....	4 6	2 7	1 7½	1 0	2 11	0 11	1 9½
224c. ....	8 8	2 6	1 8	0 9½	3 0	0 8½	1 10

#### 4. *Nasua olivacea*.

B.M.

Olive-brown, grizzled; hairs black-brown, with a yellowish sub-terminal ring; under-fur black; face pale; orbits, legs, and feet blackish brown; chest yellowish grey; tail short, with black rings and a black tip.

*Nasua olivacea*, Gray, *Cat. Mamm. B.M. App.* p. 195 (not described).

*Hab.* Santa Fé de Bogotá.

I do not know:—

1. *Nasua solitaria*, *Pr. Max. Beitr.* ii. p. 292.
2. *Nasua nocturna*, *Pr. Max. Beitr.* ii. p. 292, from Brazil.
3. *Nasua monticola*, *Tschudi, Fauna Peruana*, p. 102, t. 5, from Peru.

Are they distinct?

## Fam. 3. PROCYONIDÆ.

Nose short; underside flat, with a central longitudinal groove.  
Tail elongate. Teeth 40.

Procyonina, Gray, *P. Z. S.* 1864, p. 703.

## PROCYON.

Head broad, depressed. Ears small, ovate. Muzzle short, conical. Muffle large; under surface covered with hair, without any central groove. Nostril subhorizontal, on hinder edge of muffle. Body stout. Tail moderately long, black-ringed. Toes 5.5, front toe elongate. Soles bald, furrowed, but without pads. Claws falcate. Skull short; orbit incomplete, only contracted above and below. Teeth 40; canines sharp-edged; promolars  $\frac{4}{1}$ , three front small, conical; hinder set broad, like flesh-teeth; flesh-teeth  $\frac{1}{1}$ , upper oblong, transverse; molars  $\frac{1}{1}$ , upper ovate, transverse.

Procyon, Storr; *G. Cuvier*, 1798; *De Blainv. Ostéogr.* Subursus, t. 3; Gray, *P. Z. S.* 1864, p. 703.

Lotor, *Tiedem.*

"Prefers the vicinity of running water, where bushes are thick, or hollow trees, in which it makes its bed; when pursued, it takes immediately to the water, swimming with great rapidity and ease. The flesh is highly esteemed by the Mexicans (who call it *Tejou*) as an article of food. It throws itself on its back in a state of defence, showing its teeth in a threatening manner; but I never heard it utter any cry."—*C. B. Kennerly*.

- \* Tail bushy, four- or five-ringed; forehead of skull high, convex; brain-case moderate; palate much produced and narrow behind; grinders moderate. Procyon.—Gray, *P. Z. S.* 1864, p. 704.

## 1. Procyon lotor. (Raccoon.)

B.M.

Tail reddish, with four or five black rings. Fur ashy, more or less black-washed; lower side, ears, and feet whitish; oblique streak under the eye blackish; face whitish, with a narrow streak across the forehead before the eyes, becoming broader on the cheeks; outer side of the limbs and feet palish.

Ursus lotor, *Linn. S. N.* i. p. 70, 1766; *Schreb. Säugeth.* t. 143; *De Blainv. Ostéogr.* Subursi, t. 3 (skeleton).

Raccoon, *Lawson, Carolina*, p. 121, fig.; *Penn. Syn.* p. 199; *Shaw, Zool.* i. p. 464.

Raton, *Buffon, H. N.* vii. p. 337, t. 43; *Suppl.* iii. p. 215.

Procyon lotor, *Storr, Prod.* 1780; *Desm. Mamm.* p. 168; *Fischer, Syn. Mamm.* p. 147; *Gray, Cat. Mamm. B. M.* p. 74; *Gray, P. Z. S.* 1864, p. 704.

Meles lotor, *Bodd. Elenchus. Anim.* i. p. 80, 1784.

Lotor vulgaris, *Tiedem. Zool.* i. p. 380.

Procyon gularis, *H. Smith, Jard. Cab. Lib.* xiii. p. 222, 1842.

Procyon brachyurus, *Wiegman. Arch.* iii. p. 369; *Schreb. Suppl.* t. 143 C.

Var. 1. *melanus*; nearly black.

*Procyon obscurus*, *Wiegman. Arch.* iii. p. 370; *Schreb. Suppl.* t. 142 D.

Var. 2. *albina*.

*Meles alba*, *Brisson, Règne An.* i. p. 255.

*Ursus meles alba*, *Erxl. Syst.* p. 164.

*Procyon nivea*, *Gray, Mag. Nat. Hist.* i. p. 580, 1837.

*Hab.* America: Mexico (*Capt. Lyon*).

General colour greyish white; the tips of the long hairs black, imparting this colour to the back; under-fur black-brown; a large oblique black patch on the cheek, continuous with a paler one beneath the jaw; another behind the ears; end of the muzzle, except the upper line, together with the portion on the border of the cheek-patch, whitish; tail not tapering, with tip and four annuli black, these as broad as the rusty-white interspaces; hind feet not exceeding 4 inches, above dirty whitish; fore feet not exceeding  $2\frac{1}{2}$  inches. Varies in being nearly black, with the markings obscured; sometimes more or less yellowish or white, with obsolete markings or none—a decided tendency to albinism (*Baird, l. c.* p. 201).

Var. 3. Feet black, rather large.—*Gray, P. Z. S.* 1864, p. 705.

*Procyon Hernandezii*, *Wagner, Isis*, xxix. p. 514, 1833; *Wiegman. Arch.* iii. p. 367; *Baird, Mamm. N. Amer.* p. 215.

*Hab.* Mexico.

Var. 4.

*Procyon Hernandezii*, var. *mexicana*, *Baird, Mamm. N. A.* p. 215.

Var. 5. Yellowish; cheek-patch small.—*Gray, P. Z. S.* 1864, p. 705.

*Procyon psora*, *Gray, Ann. & Mag. N. H.* 1842, p. 261; *Voy. Sulphur*, pl. 9 & 17; *Cat. Mamm. B. M.* p. 38; *Baird, Mamm. N. A.* p. 215; *Wiegman. Arch.* 1848, p. 2.

Raccoon, *Cook's Voyage* (?); *Richardson, Beechey's Voy.* p. 4. no. 10. *Talyocoyth*, *Hernand. Mex.* p. 12. no. 37 (?).

*Hab.* Sacramento. Called "Psora."

This species varies rather in the tint of its colours in the different parts of North America. It is very apt to become white, and is the *Procyon nivea* (*Gray, Mag. N. Hist.* 1837, p. i. 580) from Texas. *Wagner*, in 1833, described the Mexican variety, which sometimes has black feet, as *P. Hernandezii* (*Isis*, xxix. p. 514); I described a specimen from California, with the tail injured, as *P. psora* (*Ann. & Mag. N. H.* 1842); and *Wiegmann* described two other varieties under the names of *P. brachyurus* and *P. obscurus* (*Arch.* iii. p. 369). *Dr. Baird*, in the 'Mammals of North America,' considers *P. Hernandezii* as species, and calls it the black-footed *Procyon*, including *P. psora*, which has feet as pale or paler than *P. lotor*.

The skulls vary considerably in the width and concavity of the palate; in some the width is half the length to the end of the tooth-line, in others less than half the length. In general there is only a single large suborbital perforation; but in specimen *d* there are two small well-separated pores.



Skulls.	Length of skull.	Length of palate.	Length of lower jaw.	Width of skull.	Width of palate.	Width of nose.	Length of nose.	Width of brain-case.
	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.
<i>P. lotor.</i> 222 <i>b.</i> .....	4 6½	2 9	3 4½	3 2½	1 0½	1 3½	1 6	2 1½
222 <i>d.</i> .....	4 0	2 5	2 11	2 9	10 1	1 13	1 9	
222 <i>e.</i> .....	4 0	2 4½	2 11	2 9	9 1	0 12½	1 9½	
222 <i>f.</i> Injured (young)...	4 0	2 6	3 0	2 20	9 1½	1 4	1 9	
<i>P. psora.</i> 223. Adult .....	4 7	2 10	3 5	3 3	11 1	1 3	1 6	2 1½

\*\* Tail slender, eight- or nine-ringed. Forehead of skull flat, in a line with the nose; brain-case swollen; palate only shortly produced, and broad behind; grinders large. Euprocyon.—Gray, *P. Z. S.* 1864, p. 705.

## 2. *Procyon cancrivora.*

B.M.

Tail reddish, with eight or nine black rings. Fur ashy, blackish-washed; feet brownish, beneath whitish; face with a large black patch, extended on to the cheeks; and one side of the limbs black.

*Ursus cancrivorus*, *Cuv. Tabl. Elém.* p. 113, 1798.

*Procyon cancrivorus*, *Illiger, Prod.*; *Fischer, Syn. Mamm.*; *Gray, Cat. Mamm. B. M.* p. 74; *De Blainv. Ostéogr. Subursi*, t. 5 (skull); *P. Z. S.* 1859, p. 432.

*Raton crabier*, *Buffon, H. N. Suppl.* vi. p. 236, t. 32.

*Hab.* South America; Demerara (*Mus. Z. S.*); Paraguay; Brazil.

Skull with one very large suborbital foramen. The palate concave. The grinders are longer, and occupy a longer line than they do in *P. lotor* and its varieties.

Skull.	Length of skull.	Length of palate.	Length of lower jaw.	Width of skull.	Width of palate.	Width of nose.	Length of nose.	Width of brain-case.
	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.	in. l.
837 <i>a.</i> Adult; imperfect behind ...	4 9?	2 8	3 7	3 3½	0 10½	1 1	1 4½	2 2½

## Section II. CAT-FOOTED BEARS (*DENDROPODA*).

The feet moderate; toes short, webbed, covered with hair, arched; last joint bent up; claws compressed, short, acute, retractile. Head rounder.

*Dendropoda*, *Gray, P. Z. S.* 1864, pp. 506, 706.

These animals climb trees, and defend themselves with their four feet, lying on their backs.

## Fam. 4. CERCOLEPTIDÆ.

Tail elongate, subcylindrical, covered with shortish hairs, prehensile. Soles of the feet bald.

Cercoleptina, *Gray, Cat. Mamm. B. M.*; *P. Z. S.* 1864, p. 706.

## CERCOLEPTES.

Head rounded. Nose short, acuminate. Ears oblong. Toes 5.5. Soles naked. Claws short, sharp. Tail elongate, hairy, prehensile. Teats two, ventral.

Skull ovate. Nose short, shelving. Forehead arched. Teeth:—cutting  $\frac{5}{8}$ , regular, lower rather shelving out; canines grooved; grinders  $\frac{5}{8}$ .  $\frac{5}{8}$ , two front conical, third like flesh-tooth; tubercular ovate, flat. The lower jaw thick, with a well-developed inferior angle. Brain ovate; case ventricose. Orbit incomplete; suborbital foramen large, single. Chin long, well marked.

*Cercoleptes, Illiger*; *Gray, P. Z. S.* 1864, p. 706.

*Kinkajou, Lacépède.*

*Potos, Cuvier.*

*Caudivolvulus, Desm.*

Professor Owen has published some notes on the anatomy (see *P. Z. S.* 1835, p. 119).

*Cercoleptes caudivolvulus.*

B.M.

Fulvous.

*Viverra caudivolvulus, Pallas, in Schreb. Säugeth.* p. 453, t. 125 B.

*Ursus caudivolvulus, Cuv. Tab. Elém.* p. 113, 1798.

*Potos caudivolvulus, Geoff. Mus. Paris; Desm. Mamm.* p. 171.

*Caudivolvulus flavus, Tiedem. Zool.* i. p. 381.

*Cercoleptes megalotus, Martin, P. Z. S.* 1836, p. 83; *Schinz, S. M.* p. 311.

*Cercoleptes brachyotus, Martin, P. Z. S.* 1836, p. 83; *Schinz, S. M.* p. 311.

*Cercoleptes caudivolvulus, Illiger, Prod.* p. 127; *Fischer, Syn. Mamm.* p. 150; *Gray, Cat. Mamm. B. M.* p. 75; *P. Z. S.* 1848, p. 76.

*Lemur flavus, Schreb. Säugeth.* p. 145, t. 42 (fig. *Penn.*); *De Blainv. Ostéogr.* Subursi, t. 5 (skeleton), t. 7 (skull).

? *Lemur bicolor, Penn.*; *Müller, Cim. Phys.* t. (badly coloured).

*Yellow Maucacoco, Penn. Syn.* p. 138, t. 16. f. 2.

*Potto, Vosmaer, Descrip. Amsterd.* 1771, t.

*Poto, Buffon, H. N., ed. Allam. Suppl.* iv. p. 160, t. 66; *Cuvier, Règne Anim.* i. p. 144.

*Kinkajou, Buffon, H. N. Suppl.* iii. p. 245, t. 50, 51.

*Prehensile Weasel, Shaw, Zool.* i. p. 403.

The two species described by Mr. Martin only depended on the artifice of the preserver.

Skull—length  $3\frac{1}{2}$  inches; breadth 2 inches, of brain-case  $1\frac{1}{2}$  inch; length of palate  $1\frac{1}{2}$  inch; breadth of nose  $\frac{1}{2}$  inch, of palate  $8\frac{1}{2}$  lines; length of tooth-line 1 inch, of lower jaw 2 inches.

## Fam. 5. BASSARIDÆ.

Tail elongate, subcylindrical, covered with long hair, not prehensile; soles of the feet covered with hair.

In the P. Z. S. 1864, p. 510, I observed that this genus is peculiar in having two tubercles on the inner lobe of the flesh-tooth, while this tooth in all the other genera has only a single tubercle on the crown of that process of the tooth.

The genus *Bassaris* has hitherto been arranged as an anomalous genus of *Viverridæ*; but Mr. Flower has shown that the skull is more like *Procyon*, and that *Bassaris* has no cæcum, like the other *Omnivora* (see P. Z. S. 1869).

## BASSARIS.

Body elongate; back not crested. Legs moderate, equal. Tail elongate, bushy, dark-ringed. Toes 5.5, separate; claws acute. Teeth 38; false grinders  $\frac{2}{3} \cdot \frac{2}{3}$ ; tubercular grinders  $\frac{2}{2} \cdot \frac{2}{2}$ . *Hab.* Mexico.

*Bassaris*, *Licht. Isis*, 1831, p. 510; *Gray, P. Z. S.* 1864, p. 512.

*Bassaris astuta*.

Fur grey.

*Bassaris astuta*, *Licht. Isis*, 1831, p. 510; *Darst. Säugeth.* t. 42; *Gray, P. Z. S.* 1864, p. 512; *Baird, Mamm. N. Amer.* t. 74. f. 2; *Eydoux, Voy. Bonite*, t. (skeleton); *De Blainv. Ostéogr. Viverra*, t. 12 (teeth).

Tepe maxthalon, *Hernand. Voy. Fav.* t. 4 & 18.

Var. *fulvenscens*. Fur more fulvous, perhaps of a different season.

*Bassaris astuta*, var. *fulvenscens*, *Gray, P. Z. S.* 1864, p. 512. B.M.

*Bassaris Sumichrasti*, *De Saussure, Rev. et Mag. de Zool.* 1860, p. 5, t. 1.

*Hab.* Mexico (called "Cat Squirrel," often domesticated) (*Phillips*).

Skull ovate, rather produced in front, more compressed. Orbit large, incomplete behind; lower edge confluent with the zygomatic arch; zygomatic arch slender, short, and much bowed out. The brain-case swollen; the contraction rather in front of the hinder edge of the orbit. The teeth normal. False grinders  $\frac{2}{4} \cdot \frac{2}{4}$ ; the upper compressed, second without any internal lobe. The flesh-tooth triangular; inner lobe broad, on the inner side of the front edge, with two distinct conical tubercles; outer side about one-third longer than the front margin. The tubercular grinders large, rather broader than long, with four small tubercles on the outer and three on the inner side; inner edge rounded; the hinder tubercular oblong, transverse, like the fore one, but smaller. The lower jaw shelving in front, the lower edge arched; the tubercular grinders



large, oblong, longitudinal, with two large tubercles on the front and two smaller in an oblique line on the hinder part of the crown. Length of skull  $3\frac{1}{4}$  inches; width of the brain-case  $1\frac{1}{3}$  inch, of the zygomatic arch  $2\frac{1}{2}$  inches.

De Saussure's figures represent the animal as if it were spotted, and the tail with only a few broad rings.

## Fam. 6. AILURIDÆ.

Tail not longer than the body, subcylindrical, covered with long bushy hairs, not prehensile; soles of the feet covered with hair.

*Ailurina*, Gray, *Cat. Mamm. B. M.*; *P. Z. S.* 1864, p. 707.

### AILURUS.

*Ailurus*, *F. Cuvier, Mamm. Lithogr.*; *Hodgson, Journ. Asiat. Soc. Bengal*; Gray, *P. Z. S.* 1864, p. 707.

Head roundish, very hairy; nose acute, short; ears short, rounded, hairy; feet short; toes 5.5; claws acute; tail elongate, tufted.

Skull ovate; nose short; zygoma much spread out. Teeth 36; grinders squarish, many-tubercled. Lower jaw arched, rounded, very large.

Lives on trees, but breeds in holes of rocks, living in pairs or small families; feeds on fruit, roots, eggs, young birds and animals. Claws completely retractile, half sheathed.

"I can only report the frugivorous habits, gentle disposition, ursine arm, feline paw, profoundly cross-hinged yet grinding jaw, and purely triturative and almost ruminant molar of *Ailurus*; anus, perineum, and prepuce entirely free from glands or pores; scrotum none; tongue smooth; pupil round; feet enveloped in woolly socks, with leporine completeness."—*Hodgson*.

### *Ailurus fulgens*.

B.M.

*Ailurus fulgens*, *F. Cuv. Mamm. Lithogr. t.*; *Hardw. Linn. Trans.* xv. p. 161; *Fischer, Syn. Mamm.* p. 157; *Gray, Cat. Mamm. B. M.* p. 74; *P. Z. S.* 1864, p. 707; *De Blainv. Ostéogr. Subursus*, t. 7 (skull imperfect).

*Ailurus ochraceus*, *Hodgson, Journ. As. Soc. Bengal*, t. 52, 53 (skull).

*Hab.* India, Nepal (called "Wah") (*Hodgson*).

In the paper above referred to, Mr. Hodgson gives an interesting account of the habits and affinities of the Wah. It walks like the Marten, climbs, and fights with all the four legs at once, like the *Paradoxuri*, and does not employ its fore feet, like the Raccoon, Coatis, or Bears, in eating.

Skull ovate; forehead arched; nose short; brain-case ovate, ventricose; the zygomatic arches very large, expanded; crown bent down behind. The palate concave in front between the canine teeth, bent up behind in a line with the tubercular teeth, and sud-

denly contracted behind them ; the hinder opening of the nostrils triangular, narrow in front. Lower jaw very strong, lower edge

Fig. 31.

Skull of *Ailurus fulgens*.

arched ; the ramus very large, elongated, extended far above the zygomatic arch, and bent forwards and then backwards at the tip. Teeth 36 ; cutting-teeth  $\frac{6}{6}$  regular, the upper lateral larger ; canines  $\frac{1}{1}$ , upper straight, grooved, lower curved ; grinders  $\frac{5}{5}$ ,  $\frac{5}{5}$ , the first upper conical, triangular ; second and third and the tubercular grinders like the flesh-tooth, squarish, with many conical processes, but smaller ; the lower grinders similar, but longer and narrower ; the condyles of the lower jaw very large, transverse.

Skulls.	Length of skull.		Breadth of skull.		Length of nose.		Breadth of nose.		Length of palate.		Breadth of palate.		Length of tooth-line.		Width of brain-case.	
	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.	in.	l.
226 <i>g.</i> Darjeeling (adult) .....	4	13	0	1	3	$\frac{1}{3}$	1	3	$\frac{3}{8}$	2	2	0	9	1	9	1
226 <i>d.</i> .....	3	10	2	5	1	3	$\frac{3}{8}$	1	1	$\frac{3}{8}$	2	0	8	1	9	1
226 <i>h.</i> .....	4	0	3	1	1	4	1	2	2	1	0	9	1	9	1	$\frac{1}{2}$

CATALOGUE  
OF  
BELLUÆ AND BRUTA (*Linn.*).

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Order BELLUÆ.

Teeth of two forms. Upper cutting-teeth 6 or none. Grinders all similar. Canines often wanting or rudimentary. Limbs exserted; toes hoofed. Skin thick, with scattered bristly hairs. Mammæ pectoral or inguinal.

Belluæ, *Linn. Syst. Nat.* ed. xi.; *Fischer, Syn.* p. 30.

Bruta, pars, *Linn. Syst. Nat.* ed. xii.

Pachydermata, *Cuvier, Règne Anim.*

Multungula et Solidungula, *Illiger, Prodr.* 1811.

Pachydermata pentadactyla et P. tridactyla, *Latr. Fam. Règne Anim.* p. 596, 1830.

Ungulata anisodactyla and Proboscideans, *Owen, Odont.* i. 1840-1845.

Ungulata perissodactyla et U. proboscidea, *Owen, Quart. Journ. Geol. Soc.* 1848.

Prince Charles Bonaparte, in his 'Prodromus Systematis Mastozoologiæ,' divided the Belluæ into four families, according to the form of the feet:—

- I. ELEPHANTIDÆ. The toes hid in the integument, the hoofs only visible. 1. *Elephantina*, 2. *Rhinocerotina*, and 3. *Hippopotamina*.
- II. SUIDÆ. Toes separate. 1. *Tapirina*, 2. *Suina*, and 3. *Anoplotherina*.
- III. HYRACIDÆ. Toes covered with skin, claws lamellar.
- IV. EQUIDÆ. Toes in the solid hoof.



*Synopsis of Suborders and Families.*

**Section I. ORTHOGNATHA.** The jaws of the usual shape, the dental edge nearly straight; the three kinds of teeth of the usual form and shape. Teats abdominal or inguinal.

**Subsection 1.** Skull and jaws tapering in front; nostrils terminal; eyes lateral. Terrestrial animals.

**Suborder 1. Nasuta.** Nose produced into a short proboscis. Toes 3.3 or 4.4; hoof subtriangular.

**Fam. TAPIRIDÆ.**

**Suborder 2. Solidungula.** Nose rounded, soft, simple; upper lip prehensile. Toes 2, united and enclosed in a single lunate hoof; lateral toes none.

**Fam. EQUIDÆ.**

**Suborder 3. Laminungula.** Nose rounded, simple; upper lip prehensile. Toes elongate, separate, applied to the ground the greater part of the length; hoof small, nail-like.

**Fam. HYRACIDÆ.**

**Suborder 4. Nasicornia.** Nose rounded, with one or more central horns of agglutinated hair; upper lip prehensile. Toes 3.3, rudimentary and reaching the ground; hoof nail-like.

**Fam. RHINOCEROTIDÆ.**

**Suborder 5. Setifera.** Nose truncated, with a bony button on the edge. Toes 4, triangular; hoofs in pairs, hinder pair not reaching the ground.

*\* Premolars permanent, forming one series with the molars.*

**Fam. SUIDÆ.** Teeth 40 or 44. Toes 4.4, outer hinder as long as the other. Tail thin.

**Fam. DICOTYLIDÆ.** Teeth 38. Toes 4.3, the outer hinder toe wanting. Tail none.

*\*\* Premolars deciduous, their place occupied by the development of the molars.*

**Fam. PHACOCERIDÆ.** Toes 4.4, hinder ones small. Molars very large.

**Subsection 2.** The front of the jaw truncated, very wide and dilated. Nostrils and eyes high up, on a line with the base of the ears. Aquatic.

**Suborder 6. Obesa.**

**Fam. HIPPOPOTAMIDÆ.**

**Section II. HETEROGNATHA.** The front of the jaws contracted, the upper jaw bent down on the non-produced, sloping lower

one. The upper and the lower cutting-teeth, when present, produced in the form of projecting tusks. Teats pectoral.

Suborder 7. **Proboscidea.** Nose produced into a proboscis with a hand-shaped end.

Fam. **ELEPHANTIDÆ.** Nose in the form of a proboscis. The upper cutting-teeth produced like tusks; lower ones absent or rudimentary.

Suborder 8. **Sirenea.** Nose truncated, with open bald nostrils. Fish-shaped, with a broad horizontal tail and fin-like fore limbs.

Fam. **SIRENIDÆ.**

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Cutting-teeth chisel-shaped, in both jaws, erect.	1. Nasuta or Tapiridæ.	Nose proboscis-shaped.
	2. Solidungula or Equidæ.	Nose rounded, nostrils open; upper lip prehensile.
	3. Laminungula or Hyracidæ.	
	4. Nasicornia or Rhinocerotidæ.	
Cutting-teeth, upper ordinary, lower shelving.	5. Setigera or Suidæ, &c.	Nose truncated, with a button above, nostrils open.
Cutting-teeth, upper and lower cylindrical, exerted.	6. Obesa or Hipopotamidæ.	Nostrils superior, valvular; mouth very large.
Cutting-teeth, upper cylindrical, tusk-like; lower none.	7. Proboscidea or Elephantidæ.	Nose produced into a proboscis, with a prehensile finger at tip.

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## Section I. ORTHOGNATHA.

The jaws of the usual shape, the dental edge nearly straight; the three kinds of teeth of the usual form and shape. Teats abdominal.

Subsection 1. *Skull and jaws tapering in front. Nostrils terminal; eyes lateral.* Terrestrial animals.

### Suborder I. NASUTA.

Nose produced into a short proboscis, soft at the end. Lower jaw narrow in front. Cutting-teeth of each jaw normal, subequal; canines normal or wanting. Toes 3.3 or 4.4, subequal, radiating, more or less free, all reaching the ground, with triangular hoofs. Neck short.

Nasuta, *Illiger, Prodr.* 1811.

Tapirinæ, *Gray, Ann. Phil.* 1825.

## Fam. 1. TAPIRIDÆ.

Nose produced into a short proboscis. Toes two or three, sub-equal, all reaching the ground, without any prehensile process on the upper edge, nail short; each with a separate hoof. Face not horned. Neck short. Cutting-teeth in each jaw, erect, normal.

*Tapirina*, Gray, *List Mamm. B. M.* p. 184.

*Tapiridæ*, Gray, *P. Z. S.* 1867, p. 877.

*Multungula genuina*, Giebel, *Säugeth.* p. 177.

*Onguligrades*, Blainville.

Mr. Selater has kindly presented to the Museum the skull of an adult Baird's Tapir from Central America, which had been sent to him by Capt. Dow; and more lately Mr. Salvin has obtained for the Museum the skin and the skull of a half-grown specimen of the same animal. Thus we have the skull of this interesting genus in two very distinct states of development. Mr. Selater has also kindly shown me a photograph of the very young animal, in its spotted and banded state, which is on its way to the Gardens of the Society. These materials have enabled me to study this very interesting animal in considerable detail. To understand its characters more completely I have compared the skull with the series of skulls of Tapirs in the British Museum and in the Museum of the College of Surgeons, and with the figures of the skulls to be found in Cuvier's 'Ossements Fossiles' and De Blainville's 'Ostéographie.'

These examinations have enabled me to point out the craniological characters by which the species may be distinguished, and also to record the differences which occur in the skulls of the different kinds as the animal passes from youth to adult age.

These researches have induced me to believe that one of the skulls of Tapirs in the British Museum indicates the existence of a South-American species that has not yet been observed in the living state.

This is not extraordinary when we recollect that the Tapir of Central America, which belongs to a peculiar group, was not distinguished from the common Tapir until the very peculiar formation of its skull was observed and figured.

There is a peculiarity in the change of the teeth of the Tapirs which I do not find noticed in Owen's 'Odontographia,' or in De Blainville's 'Ostéographie,' or in any work that has occurred to me. In most mammalia the second series of the cutting-teeth are developed rather within the base of the milk series; but in the Tapirs they are developed so far within their hinder edge that, when the milk series are about to be shed and the permanent series are just about being developed, there are two distinct series of apertures to be observed in the intermaxillaries and the front edge of the lower jaw.



The skulls of the American Tapir and of S. Baird's *Elasmognathus* in the British Museum show this peculiarity.

The skull of a young American Tapir in the Museum Collection shows the same peculiarity. In this specimen, which has lost all its milk-teeth, the development of the alveoles is not so uniform, the cavities left by the milk-teeth being much larger and more or less broken away on the outer edge; while the inner series of pits, from which the permanent teeth are to be developed, are much smaller, shallower, and far apart; perhaps they would have been larger and more developed if the animal had been allowed to live until the permanent teeth were more developed.

The space between the two series is much larger in the skull of the *Elasmognathus Bairdi*. The skull of the younger specimen of *E. Bairdi* in the British Museum has lost all its milk cutting-teeth in each of the jaws, each leaving a well-marked, regular, circular, conical cavity on the edge of the jaw. Just within these cavities, but well separated from them by a bony plate, and alternating with the cavities of the milk-teeth, is placed a regular series of six well-developed similar, but not quite so large, circular, conical cavities. At the base of each cavity is to be observed the commencement of a tooth, being the teeth of the permanent series. But the cutting-teeth of the lower jaw are more unequal in size, the central cavities being the largest, and gradually diminishing in size to the outer one. In the skulls of the young American Tapir and of the *E. Bairdi* there is a second cavity on the inner side of the base of the milk-canine. In the skull of *T. americanus* one of the milk-canines is remaining; it is of very small size, and compressed lancet-shaped in form. In the skull of *E. Bairdi* the milk-canines are shed.

In the skull of the young *Tapirus americanus* in the British Museum, which has shed its cutting-teeth, there is an abnormal tooth (probably a false grinder) to be observed on each side of the maxilla, rather in front of the middle of the space between the base of the canine and the front edge of the first grinder. They are each placed on the outer side of the jawbone, near the lower edge, and are covered with well-developed enamel, and are similar in form and size. Are these teeth similar to the front or false grinders in *Anoplotherium*?

The family may be divided into two groups or tribes.

### Tribe I. TAPIRINÆ.

The nasal aperture elongate, gradually contracted into a narrow opening in front, extending nearly to the root of the upper canines. The upper jaws only united in front as far as the root of the canines; the upper part of the sides of the nasal aperture broad, rounded. The internasal cartilage only ossified at the hinder part under the nasal bone.

M. Cuvier, in the 'Ossements Fossiles,' vol. ii. p. 145, gives the

osteology of the American Tapir (*T. americanus*) with considerable detail, and devotes a chapter to the comparison of the bones of the Indian Tapir (*T. indicus*) with those of the American Tapir (p. 156); he figures the skeleton and skull of the two species and some of the other bones. The figures of the separate skull and of the skeleton of the American species are very incorrectly drawn; they are very unlike, and both give a very false idea of the form of the nose. It is to be observed they are some of Cuvier's earliest works, drawn and etched by Cuvier himself, and certainly not to be compared with those drawn and engraved by his humble but talented colleague M. Laurillard.

Blainville, in his 'Ostéographie,' "Mammifères Onguligrades," figures:—the skeleton of *Tapirus indicus* (t. 1), and the details of the skull (t. 2), details of the members (t. 4), and of the dentition (t. 5); the skull of *Tapirus americanus* (t. 3), details of the members (t. 4), and of the dentition (t. 5); the skull of *Tapirus pinchacus* (t. 3), and details of the dentition (t. 5).

### 1. TAPIRUS.

The internasal cartilage ossified just at the hinder part under the base of the nasal; foramen magnum nearly circular. Occipital crest narrow, high. Forehead small, narrow. Canines in the maxilla just behind the intermaxillary suture. The hinder upper edges of the intermaxillaries produced behind, and forming part of the upper margin of the nasal aperture.

Teeth 42:—Inc.  $\frac{3}{3} \cdot \frac{3}{3}$ . C.  $\frac{1}{1} \cdot \frac{1}{1}$ . Pm.  $\frac{4}{3} \cdot \frac{4}{3}$ . M.  $\frac{3}{3} \cdot \frac{3}{3}$ . Milk-molars  $\frac{4}{3} \cdot \frac{4}{3}$ .

*Hab.* South or Tropical America.

*Tapirus*, Cuv. *Oss. Foss.* iv. p. 293; *Owen*, *Odont.* p. 604, t. 96. f. 4, 5;

*Gray*, *P. Z. S.* 1867, p. 879.

*Rhinocærus*, part., *Wagner*, *Syst. Amph.* p. 19.

These animals are generally brown, with white edges to the ears. The hinder part of the back above the tail is generally more or less destitute of hair.

#### 1. *Tapirus terrestris*.

B.M.

Fur short, dark brown, rather paler beneath. Skull with a high regularly arched crest over the brain-case; nasal bones over the back of the orbits elongate, triangular, acute; the front edge of the cavity of the internal nostrils in a line with the hinder edge of the sixth grinder in the adult series, or with the back edge of the last well-developed grinder in the imperfect series of grinders; the front part of the nasal apertures contracted, and gradually tapering in width towards the front end; face rather elongated; the space between the grinders and canines rather longer than the length of the outer edge of the two true grinders; the occipital end of the skull triangular, arched above, higher than broad; lower jaw with an arched lower edge.

Var. 1. The front edge of the cavity of the internal nostrils in a



line with the middle of the inner edge of the penultimate or sixth grinder in the complete series.

Var. 2. The space between the grinders and the canines larger.

In other respects both these skulls are exactly like the normal skull of *T. terrestris*.

Var. 3. With a small additional premolar close in front of the base of the usual first premolar on the right side of the lower jaw.

*Hippopotamus terrestris*, Linn. *S. N.* p. 174.

*Tapirus americanus*, Schreb. *Säugeth.* t. 319; Cuvier, *Oss. Foss.* iii. p. 277, t. 66-68; Blainv. *Ostéogr. Ongulig.* t. 1, 5; *P. Z. S.* 1850, p. 102; 1851, p. 121; 1859, p. 51; 1860, pp. 181, 261.

*Tapirus anta*, Zimm.

*Tapirus terrestris*, Gray, *List Mamm. B. M.* p. 184; *P. Z. S.* 1867, p. 877; Gerrard, *Catal. Bones B. M.* p. 275.

*Tapirus suillus*, A. Wagner, *Säugeth.* iv. p. 777, t. 319; *P. Z. S.* 1860, p. 261.

*Tapirete*, Marcq. *Bras.* p. 229, fig.

*Tapirou l'anta*, Buff. *H. N.* xi. p. 444, t. 43.

*Junior*. Cabani éléphantipède, Geoff. *Mus. Paris*; Desm. *N. Dict. H. N.* p. 503.

The British Museum possesses six skulls of this species. Four skulls are of full-grown or nearly full-grown animals; one is young, with only four grinders; and another is young, with only the milk-teeth.

These skulls show that this species is found in Brazil (where it was obtained by Mr. Miers), and also in Berbice and Demerara. The specimen from the latter country was obtained by Sir Robert Schomburgk.

The skull of the younger animal, which has only the four or five grinders developed (even when the other grinders are being developed), has the front edge of the hinder nasal aperture in a line with the hinder edge of the last well-developed grinder—that is to say, the fourth or fifth, as that tooth may happen to be the last well-developed one. A skull in this state is figured by Cuvier, *Oss. Foss.* ii. t. 2. f. 2; but the last or fifth grinder, canines, and cutting-teeth are represented more developed than they ought to be to agree with our specimens. This position of the aperture has been verified in a series of five skulls of animals with the teeth in five different states of development; in the adult skull the aperture is figured in its proper position.

In the skull of the nearly adult animal, in which the last or seventh grinder is not completely formed, but of a moderate size and nearly ready to pass through the gums, the front edge of the internal nasal aperture is in a line with the back edge of the sixth or penultimate grinder, as in the skulls of the adult animals which have cut the last or seventh grinder. The internal nasal aperture probably slightly changes its place when the animal increases in age, or is sometimes liable to variation.

In the skull of an adult (perhaps rather aged) animal, which has all the seven grinders well developed, in the British Museum, and



which agrees with the adult skull of the common Brazilian Tapir, the front edge of the hinder nasal aperture is rather more forward than in the other adult skull; that is to say, the front edge is in a line with the middle of the sixth or penultimate middle grinder. The skull figured by M. de Blainville in his 'Ostéographie,' t. 3, as that of *Tapirus americanus* agrees much better with this skull than with any other of our skulls of *T. americanus*, as, in this skull, the face is more elongated and slender. The upper line of the central crest of the skull is regularly arched, and not arched in front and with a nearly straight line on the hinder part of the crown. It differs from the skull of *T. Laurillardi* in the nasal bones being long, tapering, and acute, as in the skull of the normal *T. americanus*.

The length of the space between the hinder edge of the canine and the front edge of the first grinder in the figure agrees with that found in the *T. americanus*; that is to say, it is only rather longer than the length of the first two grinders.

There is a skull of an American Tapir in the Museum of the College of Surgeons which is rather more elongate than the rest of the skulls; and in this respect it bears some resemblance to the skull of *Tapirus Laurillardi*.

## 2. *Tapirus Laurillardi*.

B.M.

Skull with a high, regularly-arched crest over the brain-case; the nasal bones over the back of the orbit very short, broad, broader than long, and with rounded ends; the front edge of the cavity of the internal nostrils in a line with the middle of the last or seventh grinder in the complete series; the face rather elongate, the space between the canines and the grinders as long as the length of the outer side of the first three grinders; the front part of the nasal aperture suddenly contracted, and then continued as a narrow linear groove to the front of the nose; the occipital end of the skull triangular, arched, higher than broad; the lower edge of the lower jaw slightly arched, the front part rather produced and contracted; the grinders are rather small, the complete series being about  $\frac{1}{4}$  inch shorter than in the former species, being  $5\frac{1}{4}$  inches in *T. laurillardi*, and  $5\frac{1}{2}$  in *T. terrestris*.

*Tapirus Laurillardi*, Gray, P. Z. S. 1867, p. 881, figs. A & B, 1-4.

The skull here described was purchased of Mr. Brandt of Hamburg in 1852 as that of "*Tapirus americanus* from South America," without any more special habitat. I know that Mr. Brandt had a collector in Venezuela; so it may be from him, who "shot and skinned himself"—that is, the animals from that country; and Dr. Seemann says he has seen many Tapirs in that province.

I have named this species after M. Laurillard, the Assistant in the Museum of Comparative Anatomy of Paris, who made most of the drawings of M. Cuvier's 'Ossements Fossiles.' He was a most kind, attentive, modest man, who was always willing to give assistance to all students, and devoted much time to assist others in their labours;

it is to his industry and accuracy that great part of the value of the 'Ossements Fossiles' is to be attributed. I am personally indebted

Fig. 32.

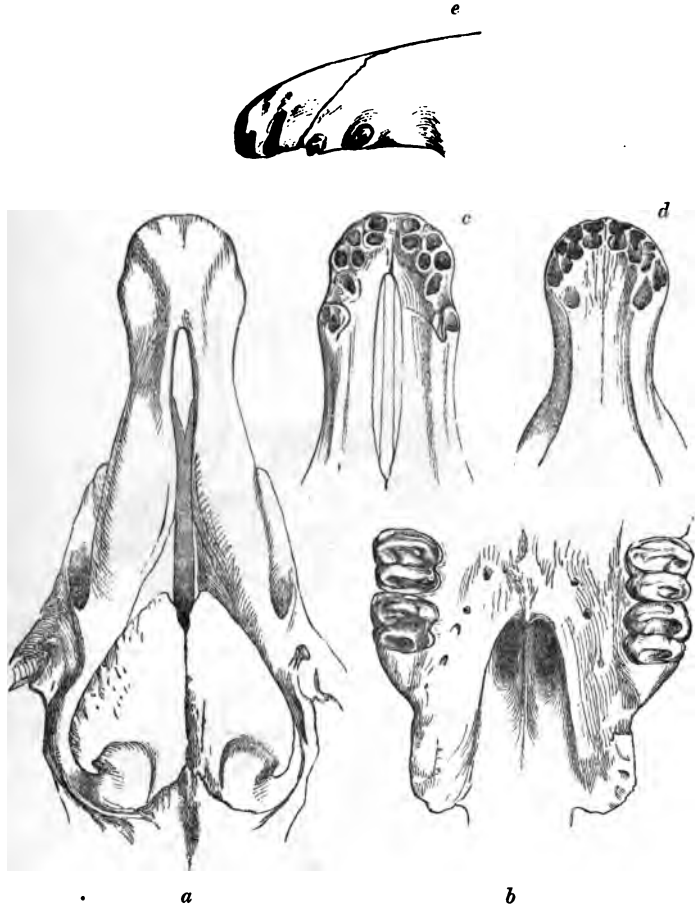


Skull of *Tapirus Laurillardii*.

to him for great kindness and an unceasing desire to facilitate any

researches that I might have in hand. He was one of those men who seem satisfied—so that the work of science progressed, any one

Fig. 33.



- a. The nasal bones and upper part of the skull of *T. Laurillardii*.
- b. Internal nasal openings of *T. Laurillardii*.
- c. End of the upper jaw of *T. Laurillardii*.
- d. End of lower jaw of *T. Laurillardii*.
- e. Front of the upper jaw of *Tapirus terrestris*, showing the rudimentary premolar.

might claim the reputation of doing it; and few men have done more for osteology and palæontology than M. Laurillard.

This skull, in the length of the front of the face and in the com-



parative straightness of the lower edge of the under jaw, agrees in some respects with the skull figured by De Blainville under the name of *Tapirus pinchacus* (t. 3). It differs from the figure of that skull in the shortness and breadth of the nasal bones, and also in the front of the upper jaw not being so much produced, and the lower edge of the lower jaw not so straight, and in the narrow linear form of the grooves in the maxillæ, between which is the internasal cartilage. The position of the internal nostril on the palate at once separates it from the other American Tapirs.

### 3. *Tapirus pinchacus*.

"Neck round, without fleshy crest. Body covered with very close blackish-brown hair, which is darker at the tips. Chin with a white spot, which is elongated behind, and bent up to the middle of the lip."

*Tapirus pinchaque*, Roulin, *Ann. Sci. Nat.* xvii. 1829, p. 107; *Wagner, Schreb. Säugeth.* vi. p. 392; *Goudot, Compt. Rend. A. S. Paris*, xvi. 1843, p. 331.

*Tapirus pinchacus*, Blainv. *Ostéogr. Ongulig.* t. 1-5; *Gray, P. Z. S.* 1867, p. 884.

*Tapirus Roulini*, *Fischer, Syn. Mamm.* p. 606; *Giebel, Säugeth.* p. 182.

*Tapirus villosus*, *Fischer*.

*Hab.* Cordilleras.

Skull, as figured by De Blainville, depressed behind, the crest being nearly straight over the brain-case; the nasal bone is elongate, acute over the hinder part of the orbit; the front edge of the cavity of the internal nostril is in a line with the back edge of the sixth or penultimate grinder in the complete series; the space between the canines and grinders is rather longer than the length of the outer side of the first two grinders; the occipital end of the skull low, broader than high; the lower jaw is nearly straight beneath.

I have never seen this species, and only know it from M. Roulin's description and the figures of the two skulls in De Blainville's 'Ostéographie.'

## 2. RHINOCÆRUS.

The internasal cartilage ossified at the hinder part; the bony plate extending above nearly the whole length of the nasal, not so far below; foramen magnum subquadrangular, large. Occipital crest very broad, flat-topped. Forehead and crown broad. Lower jaw straight beneath.

*Hab.* Asia.

*Rhinocærus*, part., *Wagner; Gray, P. Z. S.* 1867, p. 884.

### 1. *Rhinocærus sumatranus*. (The Kuda, Ayer.) B.M.

Fur very short, black; back and sides white.

*Tapirus indicus*, *Desm. Mamm.* p. 411; *F. Cuv. Oss. Foss.* iii. p. 297, t. 69, 70; *Giebel, Säugeth.* p. 183; *Blainv. Ostéogr. Ongulig.* t. 1-5.

*Tapirus sumatranus*, Gray, *Med. Repos.* 1821.

*Tapirus malayanus*, *Raffles, Linn. Trans.* xiv. p. 270; *Griffith, A. K.* iii. t.; *Horsf. Zool. Journ., Zool. Java*, t.; *Gerrard, Cat. Bones, B. M.* p. 276.

*Tapirus bicolor*, *A. Wagner, Schreb. Säugeth.* vi. p. 400.

*Rhinochærus sumatranus*, Gray, *P. Z. S.* 1867, p. 884.

*Hab.* Malacca.

The upper hinder edge of the intermaxilla triangular, narrow, produced, with a part of the maxilla on the inner side separating it from the margin of the internasal aperture. The front edge of the cavities of the internal nostrils in a line with the hinder edge of the sixth tooth when all the seven grinders are developed, and in a line with the back edge of the fifth grinder when the sixth grinder is being developed, and also when it is completed and the seventh grinder is being developed. This last or seventh grinder is developed very late in life; indeed I have not seen any skulls, either in the British Museum or in the College of Surgeons, where it is developed. There are three in each of these collections.

De Blainville (*Ostéographie, Tapirus*, pl. 2) figures the skull of an adult animal with all the seven grinders developed; and he represents the front edge of the hinder nasal opening as in a line with the hinder edge of the sixth or penultimate grinder, as in the skull of *Tapirus americanus*. The skull of the skeleton figured in plate 1 of the same work, like the skull in the British Museum, has only six grinders in the upper, and five in the lower jaw.

Cuvier (*Oss. Foss.*) states that the Malay Tapir was discovered in India by M. Duvaucel. It does not inhabit India; and M. Duvaucel only knew the animal from the drawing of it that was in General Hardwicke's collection, from a specimen obtained by Major Farquhar in Malacca, and from a skull which he obtained from the same source.

## 2. *Rhinochærus me.*

Me des chinois, *Remusat, Ann. Sci. Nat.* xviii. p. 5, t. 1.

*Hab.* China.

## Tribe II. ELASMOGNATHINÆ.

The nasal aperture short, broad, subcordate, and truncated in front by the bony ridges of the maxilla. The upper jaw with a high sharp-edged crest on the upper inner edge, embracing the sides of the very large internasal cartilage, which early become entirely ossified into a bony plate, permanently dividing the nasal cavity, and forming a high bony crest on the front of the skull.

*Elasmognathinæ*, Gray, *P. Z. S.* 1867, p. 885.

## 3. ELASMOGNATHUS.

The internasal cartilage ossified nearly the whole length, the bony part produced beyond the end of the nasal.

*Elasmognathus*, Gill; Gray, *P. Z. S.* 1867, p. 885.

*Elasmognathus Bairdii*.

B.M.

Fur very short, close, dark black-brown; lower part of the cheeks and sides of the neck bay-brown; chin, throat, chest, and front edge of the shoulders greyish white.

Young, born with pale stripes, *Verrill, Silliman's Amer. Journ. Sci.* July 1867; *Ann. & Mag. N. H.* 1867, xx. p. 232.

*Elasmognathus Bairdii*, Gill (?), fide *Verrill; Gray, P. Z. S.* 1867, p. 885, t. 42.

*Hab.* Panama: skull, Mus. Coll. Surgeons; Brit. Mus., adult and young skull.

The internasal septum is continued between the elevated sharp upper edges of the maxillæ, and even between the upper edges of the intermaxilla. It remains cartilaginous until it reaches its adult size, and then becomes ossified, forming a thick bony erect plate.

In the younger skull the cartilaginous septum is produced nearly to the root of the cutting-teeth; but in the older skull, where the septum has become ossified, the front parts of the intermaxilla are produced, and the septum ends over the root of the canines. The shortness of the nasal cavity and the sharp-edged crest of the maxillæ distinguishes the skull from those of the *Tapirs* in all ages.

The sides of the face of the skull are flattened; the zygomatic arch and the front of the orbit over the preorbital foramen is expanded, flattened, and compressing the foramen into an oblong erect shape; the upper edge of the orbit is narrow and flat, not produced into lobes as in the American *Tapir*; the nasal bones are narrow, longer than broad at the base, with an oblong deep concavity on each side of their base, which is continued upwards behind it, so as to be only separated by a small central ridge; the hinder palatine nasal opening varies in size in the two sexes, or it becomes much wider and broader in front as the animal increases in age. In the skull with the cartilaginous internasal septum, and only four grinders in each side, the concavity containing the internal nostrils is narrow and oblong. In the older skull with the septum entirely bony, and with seven grinders in each side, the concavity containing the internal nostrils is much broader, being nearly as wide as long, and the vault is more evenly rounded.

The young animal, like the young of the Brazilian and other *Tapirs*, is spotted and striped with white. Mr. Sclater kindly lent me a photograph of a young Panama *Tapir*; and a copy of the photograph was added to Mr. Wolff's figure (*P. Z. S.* 1867, pl. 42) of the half-grown animal, which Mr. Salvin obtained for the British Museum.



The young animal is described by Mr. Verrill as above quoted; and the description is printed in the 'Annals and Magazine of Natural History' for 1867, xx. p. 232.

The animal is similar to the Brazilian Tapir externally; indeed all the naturalists and zoologists who have observed it at Costa Rica regarded it as the same as that species until the skull was examined; and it is said that one was exhibited alive in the Jardin d'Acclimatation at Paris for some time as a Brazilian Tapir; but it is easily distinguishable by the bay cheek and white chest.

A large number of fossil genera belong to this suborder, as *Anoplotherium*, *Xiphodon*, *Dichotrichus*, *Cainotherium*, *Merycopotamus*, *Adapis*, *Microchaerus*, *Hippos*, *Chalicotherium*, *Palæotherium*, *Streognathus*, *Cymotherium*, *Lophiodon*, *Thoracotherion*, *Anthracothe- rion*, *Coryphodon*; but many of these are only known from a few bones or teeth.

Dr. Burmeister gives a restoration of *Macrauchenia* (Annales, p. 252, t. 12) with a slender, short, cylindrical nasal trunk; but there does not appear to be anything in the form of the nasal organs of the skull to give any authority for the existence of a proboscis, not even such a small one as is figured.

## Suborder 2. SOLIDUNGULA.

Nose round, soft, simple. Neck elongated. Upper lip prehensile. Cutting-teeth in each jaw normal, erect. Canines normal or wanting. Toes single (formed of two united together) and covered with a single hoof; no false hoofs. Stomach simple.

*Equus*, Linn.

*Solidungula*, Illiger, *Prodr.* i. p. 84.

*Solipedes* (*Solidipedes*), Cuvier, *Règ. Anim.*

*Equidæ*, Bonap. *Prodr. Mastol.*

## Fam. 2. EQUIDÆ.

Two middle toes soldered into one, covered with a single hoof; lateral toes subequal. Teeth 40: cutting-teeth  $\frac{6}{6}$ ; canines  $\frac{1}{1}$ ; grinders  $\frac{6}{6}$ ; in milk series, grinders  $\frac{4}{4}$ ; premolars  $\frac{3}{3}$ . Gullet and stomach simple. Using the hind feet in defence.

*Quadrupeda Solipeda seu Solidungula*, Rai. *Syn.* p. 62.

*Solidungula*, Illiger.

*Mam. Jumenta*, Storr.

*Solidipedes*, Cuvier.

*Equidæ*, Gray, *Lond. Med. Repos.* xv. p. 307; *Cat. Mam. B. M.* p. 262.

*Equus*, Linn.

Horses, Gray, *Knowsley Menag.* p. 70; *Cat. Ungulat. B. M.* p. 267.

*Synopsis of the Genera.*

1. *EQUUS*. Tail covered with long hair to the base. The fore and hind legs with a wart (sellander) on the inner side. Fur with round pale spots.
2. *ASINUS*. Tail with short hairs at the base and long at the end. The hind legs without any wart on the inner side. Fur striped.

1. *EQUUS*.

Tail covered with long hair to the root. The fur marked, dappled, or coppered with round pale spots, leaving a dark network. The fore and hind legs furnished with hard horny bodies, called warts or chestnuts, on the inner side above the "knees" or "wrists" on the fore legs, and below the hock or heel on the hinder ones.

*Equus*, Linn.; Gray, *Zool. Journ.* i. p. 261, 1825; *Knowsley Menag.*; *Cat. Ungulata, B. M.* p. 263, t. 37. f. 1 (skull).

The warts are rarely absent on the hind legs, for it is stated that "the bay mare 'Eaglet' was without sellanders on the hock-joint." —*Jamaica Times*, 1845, Aug. 26.

*Equus caballus*. (The Horse.)

B.M.

Brown, grey, or black, with roundish pale spots.

*Equus ferus*, Pallas, *Ross.-Asiat.* i. p. 260; *Eichw. Faun. Casp. Cauc.* p. 29.

Wilde Pferde, S. G. Gmelin, *Reise Russland*, i. p. 44, t. 9 (cop. Shaw, *Zool.* t. 414; Schreb. t. 109); Pallas, *Reis.* i. p. 211.

Takija or Wild Horses, Hamway, *Hist. Caspian Sea*, i. p. 349; Bell, *Travels*, i. p. 212; Smith, *Equidæ*, p. 146.

Var. 1. Domestic.

*Equus antiquorum*, Gesner, *Quad.* p. 132.

*Equus caballus*, Linn. *Syst. Nat.* i. p. 100; Gmel. *S. N.* i. p. 209; Desm. *Mamm.* p. 416; F. Cuvier, *Dict. Sci. Nat.* viii. p. 455; Fischer, *Syn. Mamm.* p. 429; Gray, *Zool. Journ.* i. p. 260; *Cat. Mamm. B. M.* p. 263, t. 37. f. 1 (skull); List *Mamm. B. M.* p. 182; List *Osteol. B. M.* p. 70; List Hodgson *Coll.* p. 35; Rengger, *l. c.* p. 331; Blainv. *Ostéograph. Onguligrades*, t. 1. f. 2 (skeleton).

*Equus*, *Equa*, Pliny, *H. N.*; Gesner; Pallas *Z. R.-A.* i. p. 255.

Horse, Penn. *B. Z.* i.

Generous Horse, Penn. *Quad.*

Cheval, Buff. *H. N.* iv. p. 174; Cuvier, *R. A.* i. p. 243.

Pferd, Redinger.

Ross, Schrank.

The Horse, Youatt, *The Horse, its History, Breeds, &c.*, Ham. Smith, *Equidæ*, Jardine's *Naturalist's Library*.

The Tarpan Wild Horse (primæval bay stock), H. Smith, *Equidæ*, p. 160, t. 3.

The Andalusian Horse, H. Smith, *Equidæ*, p. 247.

- South-American Horse, *H. Smith, Equidæ*, p. 247.  
 The Parameros of Peru, *H. Smith, Equidæ*, p. 248, t. 12.  
 Mexican Horse and Seminole Horse, *H. Smith, Equidæ*, p. 249.  
 Feral Horses of America, *H. Smith, Equidæ*, p. 173.  
 The Arabian Horse, *Bewick, Hist. Quad.* p. 4, fig.; *Low, Dom. Anim. Brit. Isl.* t. 1; *Smith, Equidæ*, p. 210, t. 8.  
 The Racehorse, *Bewick, Quad.* p. 6, fig.; *Low, Dom. Anim. B. I.* t. 2.  
 English Racehorse, *Smith, Equidæ*, p. 251, t. 9.  
 Hunter, *Bewick, Quad.* p. 8, fig.  
 The Old Irish Hunter, *Low, Dom. Anim. B. I.* t. 3.  
 The Connemara Horse, *Low, Dom. Anim. B. I.* t. 4.  
 Black Horse, *Bewick, Quad.* p. 10, fig.  
 The Old English Black Horse, *Low, Dom. Anim. B. I.* t. 5.  
 The Cleveland Bay Horse, *Low, Dom. Anim. B. I.* t. 6.  
 The Suffolk Punch, *Low, Dom. Anim. B. I.* t. 7.  
 The Clydesdale Breed, *Low, Dom. Anim. B. I.* t. 8.  
 Old English Road-Horse, *Bewick, Quad.* p. 9, fig.  
 Common Cart-Horse, *Bewick, Quad.* p. 13, fig.  
 Improved Cart-Horse, *Bewick, Quad.* p. 14, fig.  
 The Barb of Morocco, *H. Smith, Equidæ*, p. 224. a. The Shrubat  
 ur Reece, t. 11.  
 The Bornou (white) Race of Africa, *H. Smith, Equidæ*, p. 228, t. 10.  
 The Dongolo (black) Race, *H. Smith, Equidæ*, p. 229, t. 10\*.  
 The Turkish Race, *H. Smith, Equidæ*, p. 231.  
 The Persian Race, *H. Smith, Equidæ*, p. 233.  
 The Toorkee Races, *H. Smith, Equidæ*, p. 238.  
 The East-Indian Races, *H. Smith, Equidæ*, p. 241.  
 The New-Holland Horse, *H. Smith, Equidæ*, p. 245.  
 The Transylvania Horse, *H. Smith, Equidæ*, p. 245.  
 The Moldavian Horse, *H. Smith, Equidæ*, p. 245.  
 The Greek Horse, *H. Smith, Equidæ*, p. 245.  
 The Spanish Horse, *H. Smith, Equidæ*, p. 246.  
 Cheval d'Islande (var. islandicus), *Quoy & Gaim. Voy. Islande, Mam.*  
 t. 11; *Lesson, N. Tab. R. A.* p. 166.  
 Equus mongolicus, *Lesson, N. Tab. R. A.* p. 166.  
 Thibet Horse, *Hodgson, Journ. Asiat. Soc. Bengal*, i. pp. 348, 349.  
 Cheval à port frisien (E. frisius), *F. Cuvier, Mam. Lithog.* t.  
 Equus caballus frisius, *Lesson, N. Tab. R. A.* p. 166.  
 Villous Horse (primæval of the white stock), *H. Smith, Equidæ*,  
 p. 262, t. 4.  
 The White or Grey Horse, *H. Smith, Equidæ*, p. 262 (Marengo,  
*Bonaparte's Arab*), t. 8.  
 The Crisp-haired Horse (primæval of the black stock), *H. Smith,*  
*Equidæ*, p. 266, t. 5.  
 The Black Horse, *H. Smith, Equidæ*, p. 266, t. 14 (the English  
 Draught-Horse), p. 269.  
 The Dun or Tan Horse, *H. Smith, Equidæ*, p. 274.  
 The Decussated Horse, or the Felback Dun Horse of Ukraine, *H.*  
*Smith, Equidæ*, p. 274, t. 6.  
 The Myautzee, or the Pied Horse of China, *H. Smith, Equidæ*, p. 277.  
 The Bhooteahs' Ponies, *H. Smith, Equidæ*, p. 278.  
 The Pickarrow Ponies, *H. Smith, Equidæ*, p. 278.  
 The Yaboos' of Affghanistan Ponies, *H. Smith, Equidæ*, p. 278.  
 The Hungarian Horse (with slit nostrils), *H. Smith, Equidæ*, p. 278,  
 t. 11.  
 The Common Bashkir Horse, *H. Smith, Equidæ*, p. 278.



- The Morea Ponies, *H. Smith, Equidæ*, p. 282.  
 The Swedish and Norwegian Ponies, *H. Smith, Equidæ*, p. 282.  
 The Shetland Ponies, *H. Smith, Equidæ*, p. 283, t. 15.  
 The Galloway, *H. Smith, Equidæ*, p. 283.  
 The Dartmoor and Exmoor Pony, *H. Smith, Equidæ*, p. 284.  
 Sardinian Wild Horse, *H. Smith, Equidæ*, p. 285.  
 The Tatoo or the East-Indian Pony, *H. Smith, Equidæ*, p. 285.  
 Tuttoo or Mahratta Pony, *Sykes, P. Z. S.* 1831. (Sedulously propagated in the Dukhun: much used to transport luggage, and very vicious.—*Sykes*.)  
 Tatoo or Hack Pony of Calcutta, *Hardw. Icon. ined.* no. 10,975. t. 116, no. 10,974. t. 81.  
 The Tangum Piebald or Skewbald Horse, *Equus varius*, *H. Smith, Equidæ*, p. 288, t. 7.  
 The Tangum (or Tanghans), Primæval Piebald stock of Thibet, *H. Smith, Equidæ*, t. 7.  
 Skewbald of Achin in Sumatra, *H. Smith, Equidæ*, p. 293.  
 Tangham of China, *Hodgson, Icon. ined. B. M.* t. 212. f. 1.  
 Tangham of Lhassa, *Hodgson, Icon. ined. B. M.* t. 212. f. 3, t. 213.  
 Tangham of Gyanche, *Hodgson, Icon. ined. B. M.* t. 212. f. 3.  
 Hubstee of Deo Dharma, *Hodgson, Icon. ined. B. M.* t. 214.  
 The Koomrah, or *Equus hippargus*, *H. Smith, Equidæ*, p. 294.  
 The Koomrah, *Equus Lalisi*, *H. Smith, Equidæ*, t. 16.  
*Hippargus, Oppian.*  
*Boryes, Herodotus.*  
 Bourra of Koldagi, *Rüppell.* Northern Africa. Not gregarious.  
 The Kuda or Saran Horse, *H. Smith, Equidæ*, p. 287.  
 The Javan Horse, *H. Smith, Equidæ*, p. 287.  
 The Tamboro or Birma Horse, *H. Smith, Equidæ*, p. 287.  
 Horse with a curled moustache on the upper lip, of Asiatic Russia, *Pallas, Spic. Zool.* xi. p. 5, t. 5. f. 6; *Zoogr. Rosso-Asiat.* i. p. 250.  
 Horse covered with curled woolly hair, of Asiatic Russia, *Falk. Itiner.* iii. p. 529; *Pallas, Zoogr. Rosso-Asiat.* i. p. 250.  
 Naked Horse of a beautiful form, of Asiatic Russia, *Pallas, Zoogr. Rosso-Asiat.* i. p. 250.  
 The Argamaki of Bocharis, a White Horse with very close, minute, orbicular, brown spots, of Asiatic Russia, *Pallas, Zoogr. Rosso-Asiat.* i. p. 250.  
 Cheval, *Daubenton, Buffon, H. N.* iv. t. 10; *Cuvier, Oss. Foss.* ii. t. 1, 2, 3; *Volkman, Anat. Anim.* i. t. 11. f. 8; *Stevens, Book of the Farm*, 1284, f. 577.

*Obs.*—The specimen in the British Museum, which Col. H. Smith mentions as being like the *Koomrah* (*Equidæ*, p. 296), was a Dartmoor pony which Dr. Leach had stuffed to place in the collection of British animals.

The figure of the Wild Horse, as given by Gmelin, very much resembles the ponies left at liberty on the commons of Cornwall and mountains of Scotland, and it appears very doubtful if they are not rather to be regarded as domestic horses which have escaped and deteriorated. Pallas observes that the very young are easily tamed, but the adult never (*Z. R.-A.* p. 260). It is to be observed that this is not the case with the horses which have become half-wild in the rich prairies of America, where they have nearly retained the size and form of the well-bred horse.

The drawings of the following varieties are in the British Museum:—

- Drawing of Chinese Tangham, *Hodgson, Icon. ined. B. M. t. 212. f. 1.*  
 Drawing of Lhasa Tangham, *Hodgson, Icon. ined. B. M. t. 212. f. 2,*  
 and t. 213.  
 Drawing of Gyánché Tangham, *Hodgson, Icon. ined. B. M. t. 212.*  
 f. 3.  
 Drawing of Hubtee of Deo Dharma, *Hodgson, Icon. ined. B. M. t. 214.*  
 Tuttoo or Hack Pony of Calcutta, *Hardw. Icon. ined. B. M. n. 10,975.*  
 t. 116, n. 10,974. t. 81.

*Var. 2. The Dun-coloured Horse.*

Dun-coloured, more or less like the Ass, with a black medial dorsal stripe, and sometimes also a cross stripe on the withers and very distinct bars on the limbs.

Dun Horses, *Zoophilus (Blyth), Land and Water, 1866, Oct. 27,*  
 p. 326.

Sometimes it has a faint longitudinal stripe on the cheek and jowl. Tail and mane copious ("Burmese Ponies" at Calcutta).

*Hab.* Western India, Gujerat. Bred in the Independent Shan States, geldings only being brought down to the British provinces. See also "Eelback dun" Horses.

Horses were introduced by the French in the Falkland Islands in 1764, since which time they have greatly increased. They have never left the eastern end of the island, although there is no natural boundary to prevent them from roaming, and that part of the island is not more tempting than the rest. The stallions are said to be constantly roaming from place to place, and compelling the mares to accompany them, whether or not the young foals are able to follow, and they are left to die. The predominant colours are roan and iron-grey.

All the horses bred here, both tame and wild, are rather small-sized, though generally in good condition, and they are not so strong as the horses from the Plata.—*Darwin, Journal, p. 192.*

The Horse was first landed at Buenos Ayres in 1537, and, the colony being then for a time deserted, it ran wild: in 1580, only forty-three years afterwards, one hears of them at the Strait of Magellan. The natives of Terra del Fuego are well stocked with horses, each man having six or seven, and all the women and even children their own horse.—*Darwin, Journal, p. 233; Rengger, Natur. Säugeth. Paragua, p. 334.*

The soldiers in Bahía Blanca eat mares' flesh for food.—*Darwin, Journal, p. 101.*

In Banda Oriental they think it ridiculous to break in or ride a mare; they are of no value except for breeding, and, rarely, to tread out the wheat from the ear, for which purpose they are driven round a circular enclosure where the wheat sheaves are strewn. Numbers are slaughtered for the sake of their hides, although only worth about half-a-crown apiece.—*Darwin, Journ. p. 134.*

Darwin gives an interesting description of the breaking-in of the wild young horses of Banda Oriental.—*Journal*, p. 151.

Horses do not breed on the southern face of the Himalayas, but are imported from Thibet.—*Mundy, Journ.* ii. p. 75; *Ogilby in Royle, Himal.* i. lxxi.

Skins of horses are used for cloth, to make churns, &c.—*Simpson, Overland Journey*, ii. p. 307.

The roundish marks are called *copper-marked* in brown, *dappled* in grey horses. These marks become more visible in the brown horses when they are in high condition.

Horses are technically called according to their colours. *Bay*—brown, with black mane and tail; some have black legs, they are then called bay with black points. *Chestnut*—red-brown, either dark or light. *Brown*—nearly black; if they have a tan mouth they are called *brown-muzzles*. *Black*. *Dun-colour*. *Roan*, *Strawberry*—very red-grey. *Piebald*—with three colours. *Skewbald*,—two colours. *Cream-colour*. The white mark on the forehead is a *star*; if down the face, a *blaze*.

## 2. ASINUS. (The Zebras.)

The upper part of the tail covered with short hair, and the lower part covered with longer hair forming a tuft; the fur marked with darker stripes; the fore legs only furnished with hard horny warts in a similar situation to those in the front legs of the Horse, but there are none in the lower part of the hinder legs. Fur marked with a dorsal and more or less distinct humeral stripes.

*Asinus, Gray, Zool. Journ.* i. p. 261; *Cat. Mamm. B. M.* p. 268, t. 37. f. 2 (skull).

\* *Colour nearly uniform, with a dark longitudinal dorsal stripe; some have a black stripe across the shoulders. The Asses of Asia.*

*Asses of Asia, Gray, Knowsley Menag.* p. 74.

† *Ears elongated, acute. The Tame or Domestic Asses.*

These animals vary greatly in size and appearance according to the climate. They are large and smooth-haired in the warmer climates; small and shaggy in the colder countries.

It is very doubtful if the Domestic Ass is found in a truly wild state; the asses which have been described as wild appear rather to be domestic animals which have escaped, or mules between the Domestic Ass and the allied wild species; for when caught they, after a short time, submit themselves to man, which is not the case with what I have here considered the wild kinds.

Pallas justly observes, “In extensis Asiæ desertis primam patriam esse quærendam *Equi feri et Onagri* a Nomadibus in domesticos usus domatorum, æque ac *Hemioni* hactenus indomiti.”—*Zoogr. Rosso-A.* i. p. 255. This is equally applicable to the African species.



1. *Asinus vulgaris*. (The Domestic Ass.) B.M.

Grey, with a longitudinal dorsal streak and a dark streak across the shoulders; ears elongate; facial line arched. Skull with sub-orbital foramen as in *E. hemionus*.

*Equus asinus*, Linn.; Pallas, *Zoogr. R.-A.* i. p. 263.

*Asinus vulgaris*, Gray, *Zool. Journ.* i. p. 244; Knowsley *Menag.* p. 71; *Cat. Mamm. B. M.* p. 268.

*Equus asina*, Fleming, *Phil. Zool.* ii.

*Asinus*, Plin. *Hist. Nat.* viii. p. 44.

Ass, Penn.; Bewick.

Asne, Buffon.

Ane, Cuvier.

*Asinus onager*, "Gray," Bonap. *Index Mamm. Eur.* p. 34, 1845.

*Asinus domesticus* (Domestic Ass), H. Smith, *Equidæ*, p. 314.

*Equus hemippus*, Geoff. *Compt. Rend.* xli.; *Rev. de Zool.* vii. p. 393.

*Hab.* Palmory and Bagdad.

*Var.* 1. Without any cross.

*Var.* 2. Legs and body more or less banded.

*Var.* 3. Domestic.

Guddha of the Mahrattas (very little larger than a good mastiff or Newfoundland dog), Sykes, *P. Z. S.* 1831.

Domestic Ass of Ispahan, H. Smith, *Equidæ*, p. 314.

Domestic Ass of Beloochistan, H. Smith, *Equidæ*, p. 314.

Domestic Ass of Thibet, with a cross band, Strachey.

The Pico of ancient Egypt, H. Smith, *Equidæ*, p. 314.

Tasandunt of the Shelluhs, H. Smith, *Equidæ*, p. 314.

The Djaar of Arabia, H. Smith, *Equidæ*, p. 311.

The Lalisiones or Wild Ass Colts, H. Smith, *Equidæ*, p. 311.

Lalisio, Martial, xiii. p. 97.

Wild Ass, Lenant, *Voy. on the Bahar el Ahad*; Hoskins, *Travels in Ethiopia*.

Egyptian Ass, H. Smith, *Equidæ*, p. 312.

## OSTEOLOGY.

Asne, Daubenton, Buffon, *H. N.* iv. t. 12, 13.

*Hab.* Europe, Asia, and Africa, always domesticated.

The common Domestic Ass is sometimes of the usual grey colour, without any appearance of the cross. They are sometimes black, and at others white, rarely skewbald; but this is the common albinism and melanism of domestic animals, and when of these colours the cross is not apparent, or at least sometimes only to be seen when the animal is observed obliquely. The legs are generally destitute of cross bands, but they are often seen more or less distinctly cross-banded, especially just over the hocks (the Ribbon-legged Ass, *A. vulgaris fasciatus*, Gray, *Zool. Journ.* i. p. 245, and Guddhas of India).

*Var.* 4. *tæniopus*. Zool. Gardens.

*Equus tæniopus*, Heuglin, *P. Z. S.* 1864, p. 374.

Zeura, Lobo, *Abyssinia*, i. p. 291.

Onagre d'Abyssinie, *I. Geoffr.*

Wild Ass, *Blyth.*

Wilder Esel, *Lesson.*

*Hab.* Abyssinia, North-eastern Africa, in a wild state.

The ears are long and acute, and it brays distinctly, like the Domestic Ass. Other wild asses have a mule-like, shrieking bray.—*Blyth.*

†† *Ears moderately short, rounded.* The Wild Asses.

## 2. *Asinus onager.* (The Koulan or Wild Ass.) B.M.

Pale reddish (in winter greyish); dorsal streak black, rather wider over the small of the back; skull with the infraorbital foramen high up, about one-third the space between the face-line and the back edge of the teeth, far back, being directly over the front end of the cheek ridge and the back edge of the third grinder.

*Asinus sylvestris*, *Plin. Hist. Nat.* viii. p. 44.

*Onager*, *Plin. Hist. Nat.* viii. p. 44; *Ravi Quad.* p. 6; *Pall. Act. Acad. Soc. Imp. Petrop.* 1777, p. 258, t. 11; *Neue Nord. Beytr.* ii. p. 22, t. 2, iv. p. 80.

*Equus asinus onager*, *Schred. Säugeth.* t. 312.

*Equus onager*, *Brisson, Règ. Anim.*; *Pallas.*

Wild Ass, *Bell, Travels*, i. p. 212; *Heber's Travels.*

Koulan or Wild Ass, *Penn. Quad.*

*Equus hemionus* (Wild Ass of Kutch and the Indus), *Sykes, Proc. Zool. Soc.* 1837, p. 91 (not *Pallas*); *I. Geoff. Nouv. Ann. Mus. H. N.* iv. p. 97, t. ♀, 3 years old.

*Asinus hemionus*, *Gray, Osteol. Spec. B. M.*; *H. Smith, Equidæ*, p. 316, t. 20; *Gray, Proc. Zool. Soc.* 1849, p. 29; *Knowsley Menag.* p. 71.

*Asinus onager*, *Gray, Cat. Ungulata B. M.* p. 269.

*Equus Khur* (Ane Khur), *Lesson, Manuel Mamm.* p. 347, 1827.

Wild Ass or Gour, *Ker Porter, Travels Georgia, Persia*, i. p. 460.

Wild Ass or Khur of the Persians, *Isis*, 1823, p. 764.

*Onager*, *Xenophon*; *Barboza, Collect. Ramusio*. i. p. 300, b. (Malabar and Golconda).

*Hemione* or *Dziggtai*, *Lesson, Comp. Buffon*, x. p. 379 (from *Geoffroy*); *F. Cuvier, Mamm.* 1823 (not *Pallas*).

The Hymar or Hamar of Mesopotamia, *H. Smith, Equidæ*, p. 313.

*Asinus Hamar* (the Hamar), *H. Smith, Equidæ*, t. 19.

*Chamor of the Hebrews.*

*Hab.* The Plains of Mesopotamia (B.M.); Persia, Kutch, shores of the Indus, Punjab.

In the British Museum is a skull and bones of body from India, Kutch, presented by the Earl of Derby.

They are abundant in Mesopotamia, and are evidently the Wild Ass of *Xenophon*. The adults are very difficult to approach within rifle-range. The young are sometimes caught alive.—*Layard.*

The Khur inhabits the deserts of Persia in troops, frequenting the hills in summer and the plains in winter.

*Pallas*, in a paper entitled "Observations sur l'Asne dans son état

sauvage, ou sur le véritable Onagre des anciens" (Act. Acad. Sci. Imp. Petrop. 1777, p. 258, t. 11), figured a Wild Ass which was sent by sea from Derbent to Astracan. The figure greatly resembles the mule between the Hemione and the Ass in the Zoological Gardens; but the ears appear a trifle longer. It is coloured in the same manner as the Hemione; that is to say, the more prominent parts of the body are dark, and the middle of the back, the front of the haunches and thigh, and the under part of the body are paler. The figure represents but a very indistinct cross band on the shoulder.

On this Pallas observes, "L'étalon différait encore de la femelle en ce qu'il avait tout le corps plus robuste, l'encolure plus grosse, le poitrail et la croupe plus large, et surtout par un barre ou raye transversale (tab. xi.), qui croisait sur les épaules avec celle qui s'étend le long de l'épine dans l'un et l'autre sexe. C'est cette croix que la plupart des ânes domestiques mâles ont conservés, et qui embellit surtout ceux qui ont la couleur du poil claire. Cette barre transversale bien plus étroite que l'autre manque entièrement aux Onagres femelles: quelques Tartares m'ont au contraire assuré qu'elle se voyait assez souvent double dans les mâles" (l. c. p. 269).

This paper is translated into German, and a copy of the plates with a second figure of the back of the animal is given in Pallas, N. Nord. Beytr. ii. p. 22, t. 2; but in this figure the cross band on the shoulders is not marked. From this description it would appear that the animal which is called the Wild Ass is not always marked with the cross band on the shoulder which is so permanent in the domestic kind and has hitherto been considered its specific character.

The chief difference between Pallas's figure of the Wild Ass and the Hemione is the greater length and more acute form of the ears; of the latter the mule varies in this character.

"No attempt has been made to break the Wild Ass (of Rajpootana) in for riding, nor did it appear that the natives ever thought of such."—*Bishop Heber*; *H. Smith, Equidæ*, p. 311.

"The Wild Ass of Cutch has the cross stripe on the shoulder, and differs in colours and heavier proportion from the Wild Ass of Ker Porter."—*Bishop Heber*; *H. Smith, Equidæ*, p. 311.

Col. Ham. Smith confounds the domesticated Guddha with the Wild Ass of the Deccan described by Colonel Sykes, and states, on the Colonel's authority, that "it is not larger than a mastiff" (*Equidæ*, p. 307).

Eversmann states that many specimens of the *Kulan* or *Equus onager*, Pallas, have been brought to Orenburg from the high steppes between the Caspian and the Aral seas. A good specimen and a skull are in the Museum of the University of Kasan. All these specimens are without the cross band, and have only the longitudinal dorsal streak. Eversmann considers that the cross band is either not the character of the species, or perhaps a sexual mark, as he observes that he is not able to discover the specific cha-



rafter which separates the *E. hemionus* from the *E. onager*. He further observes that the Mongolians have no particular name for the *E. onager* of Pallas; the Tartars no name for *E. hemionus*: the Mongolians called the *E. hemionus* "Dshiggetei," or more properly "Tschikitei," meaning *long ears*, and the Tartars call the *E. onager* "Kulan."

Eversmann remarks that Pallas (N. Nord. Beytr. ii. p. 34) states that the male M. Hablitzl brought from Persia had no cross, but that the female which was shot on the Murecy had one. He proceeds to calculate the length of the ears of these animals, compared with the other measurements of them, and he finds that the ears of the male appear to be considerably (near 2 inches) shorter in proportion than the ears of the female (Bull. Soc. Imp. Nat. Mosc. 1840, p. 57).

The Mule with *Asinus domesticus* has the short smooth fur exactly like the sire, but with a short narrow cross band on the shoulder, the ears rather longer and black-tipped.

### 3. *Asinus hemionus*. (The Kiang.)

B.M.

Fur short, smooth, bright red-bay; legs straw-colour (in winter long, rather woolly, greyish, legs whitish), with a broad longitudinal dorsal streak, broadest over the small of the back, without any cross band on shoulders. Skull—the infraorbital foramen low down, in the centre of the space between the face-line and the base of the teeth, and placed in a line over the back edge of the second grinder, some distance in front of the end of the cheek-ridge.

*Mulus dauricus fecundus*, Messersch. MSS.

*Equus hemionus*, Pallas, Nov. Comm. Petrop. xix. p. 394, t. 7 (cop. Neue Nord. Beytr. ii. p. 31, t. 1); Reise, iii. p. 217 (cop. Schreber, Singeth. t. 311); Eichw. Faun. Casp. Caur.

*Equus hemionus* (Kiang), Ogilby, in Royle, Himal. i. p. lxxi; Walker, Journ. Asiat. Soc. 1848, t. 1.

*Equus hemionus*, Bodd.

*Asinus hemionus*, Gray, Zool. Journ. i. p. 244; Cat. Ungulata B. M. p. 272 (not Knowsley Menag.).

*Equus onager*, Eversmann, Bull. Soc. Imp. Nat. Mosc. 1840, p. 56.

? *Asinus onager* (Onager koulán, or Wild Ass of Tartary), H. Smith, Equide, p. 307, t. 18?

*Asinus equoides*, Hodgson, Journ. Asiat. Soc. Beng. xi. p. 287; Blyth, Journ. Asiat. Soc. Beng. xi. p. 287.

*Asinus kiang*, Gray, Cat. Mamm. B. M. t. 37, f. 2 (skull).

Wild Ass, Moorcroft, Travels.

*Equus kiang*, Moorcroft, Residence at Ladack, i. pp. 311, 443; Lesson, Manuel; Gray, Proc. Zool. Soc. 1849, p. 29; Knowsley Menag. p. 72; Hodgson, Journ. Asiat. Soc. Calc. 1842, p. 286.

*Equus varius*, part., Ham. Smith, Equide, p. 289.

*Asinus polyodon*, Hodgson, Calcutta Journ. N. H. 1847, p. 469, t. 6 (animal and skull).

Jikta, Shaw, Zool. ii. p. 427.

Dshikketei, Penn.

Dgiggetai, Cuvier, R. A. i. p. 244.

- Dzigethai, *Buffon, Supp.* vi. p. 37.  
 Wild Mule, Half Ass, or Fecund Mule, *Penn. Quad.* i.  
 Wild Ass, *English in Thibet*.  
 Hemionos, *Plin. Hist. Nat.* viii. c. 44.  
 L'Hémione, *Ency. Méthod.* t. 42. f. 4.  
 The Ghoor or Khur, *Moorcroft; H. Smith, Equidæ*, p. 310.  
 Wilder Esel, *Eversmann, Bull. Mosc.* 1840; *Wagner, Wiegmann, Arch.* 1842, viii. p. 49.  
 The Kiang, *H. Smith, Equidæ*, p. 289.  
 Wild Horse, *Gerrard, Asiat. Research.* xvii. p. 247.

*Hab.* Thibet.

There is a male between winter and summer fur, from Thibet, presented by Lord Gifford, and a male from Thibet, presented by the Hon. East-India Company, in the British Museum.

*Var.* 1. With a distinct cross band on the shoulder like the Domestic Ass.

*Hab.* Thibet (*Capt. Strachey*).

*Var.* 2. With the vertebral dorsal streak very obscure or entirely wanting.

*Hab.* Thibet (*Capt. Strachey*).

There are in the British Museum:—a skull from Thibet, presented by B. H. Hodgson, Esq.; two skulls, lower jaw wanting, presented by B. H. Hodgson, Esq. (the specimens referred to by Mr. Gray in the *P. Z. S.* 1839); and a skull from Thibet, north of Ladack, presented by the Earl of Gifford.

The forehead of all the three specimens of the skull of *E. hemionus* from Thibet is rather convex between the eyes, and the centre of the face is narrow and keeled on the sides; while in the skull of *E. onager* from Kutch the forehead is flat between the eyes, and the centre line of the face is rather broader and rounded gradually off on the sides, and the incisive bone is longer and more gradually arched, making the incisors more perpendicular in the latter than in any of the former.

But the most distinctive character between the four skulls is in the position of the infraorbital foramen. In *E. onager* it is high up, about one-third the space between the face-line and the back edge of the teeth; it is far back, being directly over the front edge of the cheek-ridge and the back end of the third grinder; while in all the three specimens of the skulls of *E. kiang* this foramen is lower down, being nearly in the centre of the space between the face-line and the base of the teeth, and it is placed on a line over the back edge of the second grinder, some distance in front of the end of the cheek-ridge. The under surface of the body of the posterior sphenoid is narrow and convex in *E. hemionus*, and broad and flat in *E. kiang*. The vomer is much more compressed in the latter than in *E. hemionus*. I am not certain that the distinctions here described may be sufficient to show that these two animals are separate species; but they indicate the necessity of the subject being more fully examined.



The position of the suborbital foramen in the *E. hemionus* more nearly resembles the *E. asinus*, and the *E. onager* the *E. zebra* and *E. Burchellii* (Gray, Proc. Zool. Soc. 1849, p. 29).

Two of the skulls of the *Equus kiang* show the small rudimentary grinder in front of the other; but this tooth is to be more or less distinctly observed in the skulls of the other Equidæ in the Museum collection. In the skull of *Equus Burchellii* in the British Museum collection, this tooth is placed on the inner side of the first true grinder.

The suborbital foramen in the skulls in the India House from Thibet rather varies in position, but in all it is placed over the middle or third tooth. In the old male it appears to be rather higher than in the nearly adult female and in the young skull, where the hinder grinder is just springing out.

This animal must not be confounded with the domestic asses which are used for burden in Thibet (Capt. Strachey).

The male Kiangs are larger and deeper-coloured. They live, in troops of from eight to ten under the care of a solitary male, where the thermometer is below zero. They live partly on the plains and partly on the mountains; and the lower surface of the hoof varies considerably in form and concavity, perhaps from that circumstance.

The Ghoor Khur of Ladakh, according to Moorcroft, is white about the nose and under the neck, the belly, and legs; the back is light bay, and the mane dun. They herd in droves, fly at a trot, stop, and look back.—*H. Smith, Equidæ*, p. 310.

Moorcroft saw the Kiangs on the highest summits of Thibet in their *shining summer coats* and with their Antelope-form, scouring along in numbers.—*H. Smith, Equidæ*, p. 286.

Dr. Walker observes:—The Kiang neighs like a horse. The Wild Ass of Cutch brays like an Ass. The Kiang has no Zebra-stripes, neither in the adult nor in the foal. The Wild Ass of Cutch: transverse Zebra-stripes are seen on the shoulder in the adult, and still more in the foal. Sometimes also the shoulder-cross has been seen. The habitat of the Kiang is on the high tableland of Thibet; of the Wild Ass of Cutch, in the sultry plains near the mouth of the Indus.

The Kiang of Chinese Tartary greatly exceeds that of the Donkey of Cutch in size; the stallions often stand 14 hands high. Major Charlton and Major Biddulph state that they neigh like a Horse. When taken young they will become so tame as to be led about like a Horse, and will follow horses almost anywhere. They live in a climate where the temperature is below the freezing-point in the middle of the summer; yet they throw off their pale woolly coat during that season and become bright bay (Major Charlton).

The Donkey of Cutch is often domesticated in India (*idem*).



?? 4. *Asinus equuleus*. (The Yo-to-tze.)

Yellowish-red clay-colour. Tip of ears, mane, long hairs of tail, well-defined line down the back to middle of tail, and cross band on shoulder, three or four cross streaks on knees and hocks, black.

*Asinus equuleus* (the Yo-to-tze), *H. Smith, Equidæ*, p. 304; *Gray, Cat. Ungulata B. M.* p. 275.

*Asinus hippargus* (the Yo-to-tze), *H. Smith, Equidæ*, t. 17.

The specimen described by Col. H. Smith was alive in a livery-stable near Park Lane, London; it was said to have been brought from the Chinese frontier north-east of Calcutta. It was most probably a Kiang, or perhaps a mule between it and the Domestic Ass.

\*\* *Body with a black dorsal streak and many more or less distinct transverse or curved streaks. Ears rather short and broad-tipped. The Zebras of South Africa.*

*Hippotigris, H. Smith.*

*Hippotigrine group or Zebras, H. Smith, Equidæ*, p. 320.

† *Hoofs slightly concave beneath; legs white, not or only slightly cross-streaked. Living on the open plains.*

5. *Asinus quagga*. (The Quagga.)

Brown. Head, neck, and withers or front of body blackish-streaked; lower part of body, legs, and tail white. Hoofs flattish beneath.

*Asinus quagga, Gray, Zool. Journ.* i. p. 246; *List. Mamm. B. M.* p. 183; *Cat. Ungulata B. M.* p. 275; *J. Brookes, Mus. Cat.* p. 20, 1828.

*Equus quagga, Lesson, Man. Mamm.* p. 347.

*Equus quagga, Gmelin, S. N.* i. p. 213; *Schreb. Säugeth.* t. 317; *F. Cuv. Dict. Sc. Nat.* vii. p. 473, t. ; *Harris, W. An. Afr.* t. 2.

*Female Zebra, Edw. Glean.* i. t. 223.

*Le Couagga, Buffon, H. N. Supp.* iii. t. 4; *Cuvier, Mus. Ménag.* t. ; *F. Cuvier, Mam. Lithog.* t.

*Kwagga or Couagga, Buff. Supp.* vi. p. 85; *Knight, Mus. Anim. Nat.* f. 480.

*Opeagha or Quagga, Masson, Phil. Trans.* lxi. p. 297.

*Hippotigris quacha* (the Quagga of the Cape Colonists), *H. Smith, Equidæ*, p. 330, t. 24.

*Quagga, Shaw, Zool.* ii. p. 240.

*Quacha, Penn. Quad.* i. p. 14.

*Hab.* Cape of Good Hope, on open plains.

? Young, stripes very indistinct. South Africa. Presented by W. Burchell, Esq., LL.D.

*Equus Isabellinus, Temm. MS.; H. Smith, Equidæ.*

*Hippotigris Isabellinus* (the Isabella Quagga), *H. Smith, Equidæ*, p. 332, t. 25.

*Ane Isabelle*, *Le Vaillant*.

Lesson places the Quagga with the true Horses, because the hair extends nearer to the base of the tail, overlooking the warts and other natural characters (Nov. Tab. R. A. p. 166, 1842).

The Quagga is found in herds near the Cape Colony.

Le Vaillant, as Col. Smith observes, only saw, and did not possess, the *Ane Isabelle*. The specimen in the British Museum described and figured by Col. H. Smith was certainly only a young Quagga in a very imperfect condition, having lost nearly the whole of its fur before it was stuffed. It was presented by Dr. Burchell as the skin of a Quagga.

#### 6. *Asinus Burchellii*. (The Peetsi or Peechi.) B.M.

Pale brown, underside of body whitish; head, body, and upper part of leg black-streaked; tail, inside and lower part of leg white. Hoof rather broad, only slightly concave beneath. Skull—sub-orbital foramen as in *E. hemionus*.

*Equus zebra*, *Burchell, Travels*, i. p. 139, vig. at p. 252.

*Asinus Burchellii*, *Gray, Zool. Journ.* ii. p. 247, t. 9. f. 1 (animal), f. 2 (hoof), 1824; *List Mamm. B. M.* p. 183; *Cat. Ungulata B. M.* p. 276.

*Equus zebroides*, *Lesson, Man. Mamm.* p. 346; *Nov. Tab. R. A.* p. 166, 1842.

*Equus Burchellii*, *Bennett, List Animals Zool. Gard.* 1830, p. 40. n. 62; *Fischer, Syn. Mamm.* p. 432.

*Equus zebra* (male), *F. Cuvier, Mus. Ménag.* t.

*Equus montanus* (the Dauw), *F. Cuvier, Mamm. Lithog.* t. (female and foal) (not *Burchell*); *Lesson, Mammifères*, i. p. 248.

*Hippotigris Burchellii* (the Dauw), *H. Smith, Equidæ*, p. 329, t. 23 (♀ & jun.).

*Burchell's Zebra*, *Harris, W. A. Africa*, t. 5; *Knight, Mus. Anim. Nat.* f. 481.

Striped or Bonte Quagga of the Cape Colonists, *Harris, l. c.* p. 7.

Peet-sey of the *Matabuli and Bechuanas*.

Dauw, *F. Cuvier, Mamm. Lithog.* t.

*Hab.* South Africa, plains.

*Var.* Leg more or less banded.

*Equus Chapmani*, *Layard, P. Z. S.* 1865, t. 22.

*Hab.* South Africa (*Baines*).

The skull of a female from South Africa is in the British Museum.

Found in herds in every district north of the Orange River. It admits of being tamed to a certain extent with considerable facility, and occasionally a half-domesticated specimen is exposed for sale in Cape Town with a rider on its back: even in the most tractable state to which it has yet been reduced, it is regarded as wicked, treacherous, obstinate, and fickle.—*H. Smith*.



M. F. Cuvier has applied the Hottentot name for the true Zebra to this species, and used for it the name *E. montanus* (which Burchell gave to that animal), though it only inhabits the plains.

†† Hoofs narrow, deeply concave beneath; legs cross-banded. Living on the mountains.

#### 7. *Asinus zebra*. (The Zebra.)

White; head, body, and legs to the hoofs black-banded; nose reddish; belly and inside of thighs not banded; tail-end blackish. Hoofs narrow, deeply concave beneath. Skull—suborbital foramen as in *E. hemionus*.

*Zebra indica*, *Aldrov. Solid.* p. 416, fig.; *Raii, Syn.* p. 64.

*Equus indicus*, *Jonston, Quad.* t. 5.

*Equus brasiliensis*, *Jacob. Mus. Reg.* p. 3, t. 2. f. 1.

*Hippotigris*, *Dio Cass. Hist.* l. 77.

*Equus zebra*, *Linn. S. N. i.* p. 101; *Schreb. Säugeth.* t. 316.

*Asinus zebra*, *Gray, Zool. Journ.* ii. p. 248, t. 9. f. 3 (hoofs); *Cat. Mamm. B. M.* p. 183; *Osteol. Spec. B. M.* p. 70; *J. Brookes, Mus. Cat.* p. 20, 1828.

*Zèbre*, *Buffon, H. N.* xii. t. 12.

*Zebra*, *Ray, Quad.* p. 69; *Penn. Quad.*; *Knight, Mus. Anim. Nat.* f. 479, 508.

*Sebra*, *Stubb.*

*Hippotigris campestris*, *H. Smith, MS. l. c.* p. 329.

*Equus montanus*, *Burchell, Travels*, i. pp. 139, 265, ii. p. 270; *Harris, W. A. Africa*, t. 24. f. 1.

Male Zebra, *Edwards, Glean.* i. t. 222.

Wild Paard or Wild Horse of the Dutch Colonists, *Burchell, Trav.*; *Harris, l. c.* p. 7.

Wilder Esel, *Kolbe.*

Daow (or True Zebra) of the Cape Colonists, *Harris, l. c.* p. 7.

Zeura or Zuora, *Lobo, Abyss.* i. p. 291?

Wild Ass, *Kolbe, Cape*, ii. p. 112.

Var.? *Hippotigris zebra* (the Zebra), *H. Smith, Equidæ*, p. 324, t. 21.

*Hippotigris antiquorum* (the Congo Dauw or Zebra of Pigafetta), *H. Smith, Equidæ*, p. 327.

*Hippotigris antiquorum* (Angola Dauw), *H. Smith, Equidæ*, t. 21.

*Hab.* South Africa, mountains.

There is in the British Museum a skeleton from South Africa, two skulls from South Africa, a skull of a male Mule between Zebra and Ass, and the skull of a hybrid between *Asinus zebra* and *Asinus vulgaris*, presented by the Zoological Society of London.

#### *Mules or Hybrids of the different species of Horses.*

1. The Common Mule (the hybrid between the Ass and the Mare).

*Mulus*, *Raii Quad.* p. 64.

*Equus asinus mulus*, *Gmelin.*

*Equus mulus*, *Schreb.* t. 214.



Mule, *Pennant*.

Grand mulet, *Buffon*, *H. N.* iv. t. 12.

Maulthier, *Bechstein*.

Mule, *Bewick*, *Hist. Quad.* p. 16, fig.; *H. Smith, Equidæ*, p. 334.

Common Mule, *H. Smith, Equidæ*, p. 344.

Grey Mule of Egypt and Barbary, *H. Smith, Equidæ*, p. 345.

Black Mule of South of France and Spain, *H. Smith, Equidæ*, p. 345.

The Dun-coloured Mules of Volterra (Italy), *H. Smith, Equidæ*, p. 346.

2. The Hinny (the hybrid between the Horse and the she Ass).

Hinnus, *Arist. H. A.* i. c. 7.

*Equus asinus hinnus*, *Gmelin*.

*Equus hinnus*, *Schreb.* t. 215.

Petit Mulet, *Buffon*, *H. N.* iv. t. 13.

Maulesel, *Bechstein*.

The Hinny, *H. Smith, Equidæ*, p. 346, t. 30.

3. Mule of a male Hemione and a female Zebra (Knowsley Menag. t. 57. f. 1). The shoulders and legs are banded. B.M.  
An adult, bred at Knowsley, presented by the Earl of Derby.

4. Mule of a male Maltese Ass and a Zebra (Knowsley Menag. t. 57. f. 2).

The body and legs are striped; the stripes on the head and body are narrow, except the shoulder-cross, which is very distinct and forked; the rump is covered with small spots.

Ribbon-legged Ass (*Asinus vulgaris*, var. *fasciata*), *Gray, Zool. Journ.* i. p. 245.

An adult, bred at Windsor Park.

B.M.

5. Mule between a male Ass and Zebra.

Grey indistinct cross, and a few narrow dark stripes on the shoulders and fore legs; tail elongate, end tufted, upper part slightly banded; ears moderate.

Métis femelle d'Ane et de Zèbre, *F. Cuvier, Mamm. Lith.* t. 9.

This is very different from the Mule with the Maltese Ass. It has scarcely any stripes.

6. Mule between a male (?) Burchell's Zebra and a common Ass (Knowsley Menag. t. 58. f. 1).

Grey, with very indistinct bands on the front of the back; a more distinct, short, narrow cross band, divided into three below, and with some black cross bands on the outside of the legs.

An adult. Used to draw in a tandem. Bred in the Zoological Gardens.

B.M.

7. Mule between a male domestic Ass and an Hemione (Knowsley Menag. t. 58. f. 2).

It is very like the mother, but has a distinct black cross-band and some indistinct cross bands on the outside of the hocks and knees.

This animal was living in the Gardens of the Zoological Society. It changes its colour and becomes greyer in winter, like its female parent. I have seen another example of this Mule, exactly like the one here described.

8. Mule between an Hemione and a Burchell's Zebra (Knowsley Menag. t. 59. f. 1).

Reddish grey; head, neck, and front part of the body with very narrow, rather darker streaks.

9. The Hybrid Ass and Zebra (H. Smith, *Equidæ*, p. 343, t. 28; Mus. Paris, from F. Cuvier).

Quagga Mule, *H. Smith, Equidæ*, p. 343, t. 29.

Zebra Donkey or Mule Zebras (bred between the two species of Zebra and the Donkey), *Bennett, List Anim. Zool. Gard.* 1830, p. 13. n. 63 & 43.

10. Mules between Male Quagga and Mare (Morton, *Phil. Trans.* 1821).

The Hybrid first foal of Brood Mare and Quagga, *H. Smith, Equidæ*, p. 342, t. 26.

The Filly bearing marks of the Quagga, *H. Smith, Equidæ*, p. 342, t. 25.

The Colt, the third issue of Brood Mare and the second by the Black Arab, *H. Smith, Equidæ*, p. 324, t. 27.

The Brood Mare and the third foal with marks of the Quagga, *H. Smith, Equidæ*, p. 324, t. 14.

11. The offspring of a Mule (the produce of a male Ass and a Zebra) with a bay mare Pony (Knowsley Menag. t. 59. f. 2).

Iron-grey; with a short narrow cross band on withers, very faint indications of stripes on the sides, and more distinct dark stripes on outsides of the hocks and knees; tail bushy from the base, like a horse's; head heavy; mane brown and grey.

This animal was used to draw a small cart about London. It stood 8 hands high.

### Suborder III. LAMINUNGULA.

Nose rounded, simple. Upper lip prehensile. Upper cutting-teeth elongate, produced, triangular, like tusks; lower normal, erect, three-lobed. Canines none or rudimentary. Toes elongate, separate, applied to the ground the greater part of their length, with nail-like hoofs.

*Laminungula, Illiger, Prodr.* 1811.



## Fam. 3. HYRACIDÆ.

Nose blunt, without horns. Body covered with hair, with scattered longer bristles. Toes rather elongate, blunt, with flat claws. Tail short or none. Teeth 34: incisors  $\frac{1}{2} . \frac{1}{2}$ ; canines  $\frac{0}{0} . \frac{0}{0}$ ; premolars  $\frac{4}{4} . \frac{4}{4}$ ; molars  $\frac{3}{3} . \frac{3}{3}$ .

*Hyrax*, Hermann.

*Lipura*, Illiger.

*Hyracidae*, Bonap. *Prodr. Mastol.*; Schinz, *Syst. Mamm.* p. 328; Gray, *Ann. & Mag. N. H.* ser. 4. vol. i. p. 35, 1868.

The species of the *Hyraces* are well marked both externally and anatomically; but there is great confusion as to the names that have been given to them in the systematic catalogues.

Prosper Alpinus, in his list of animals of Egypt and Arabia, indicated a species of *Hyrax* under the name of *Agnus filiorum Israël*, which Shaw regarded as a large Jerboa; but Bruce corrected this error in his account of the Ashkoko.

Pallas described and figured the Cape species under the name of *Cavia capensis*, and Buffon as the *Marmotte du Cap*. It is well known to naturalists as *Hyrax capensis*.

Bruce notices a *Hyrax* under the name of Ashkoko, which he described as coloured like a wild rabbit, with scattered black bristles and white beneath. This well agrees with a *Hyrax*, now found in Abyssinia, Dongola, and Upper Egypt, which is in the British Museum. Bruce states that the animal is also found in Mount Lebanon and Arabia Petrea.

Schreber, who only knew the animal from Bruce's figure and description, applied to it the scientific name of *Hyrax syriacus*. The Asiatic species is very like the African; but I believe it is distinct; and in that case Schreber's name is not applicable to the African animal to which Bruce gave the name of Ashkoko ("coloured like a wild rabbit and white beneath"), and which has a yellow dorsal streak. Capt. Harris, who collected animals in Abyssinia, sent home several specimens of a large blackish *Hyrax* having a large black dorsal spot and grey beneath, which he says is called Ashkoko by the natives; but it can scarcely be the Ashkoko of Bruce, as it does not agree with either his description or figure: perhaps this name is generic. *Hyrax* is also called Gike in Abyssinia, according to Salt.

Mr. Tristram informs us that the *Hyrax* in Palestine and Sinai is called Weber, and Thofun in Southern Arabia. Bruce evidently confounds these *Hyraces* together as one species.

Several zoologists have doubted whether the Ashkoko of Bruce was distinct from *Hyrax capensis*: no one can doubt the fact who compares the two. But the large blackish animal which is also found in Abyssinia, and called by the same name as Bruce applies to his species, is so like the *H. capensis* that it would be doubtful if it



is a distinct species, if there were not such a difference in the skull. Hemprich and Ehrenberg regard it as distinct, and call it *H. habessinicus*.

Hemprich and Ehrenberg, in the 'Symbolæ Physicæ,' described and characterized by their colours and osteological characters four species of *Hyrax*, viz. :—1. *H. capensis*, 2. *H. syriacus* vel *sinaiticus*, 3. *H. habessinicus*, 4. *H. ruficeps* vel *dongolicus*. They figure three; for the dark animal figured with *H. syriacus* represents a young *Hyrax habessinicus*.

There is no specimen in the British Museum that has a red head, although Prof. Ehrenberg called one of his species *H. ruficeps*; but I think that probably he gave that name to the species which we received from Dr. Rüppell as *A. abyssinicus*, and which I believe to be the Ashkoko of Bruce.

There are specimens of four distinct species in the British Museum that have a more or less distinct yellow dorsal streak; and there is another, discovered by Dr. Welwitsch. Four came from Africa, and one from Arabia in Asia. They differ from each other in the texture and the general colour of the fur and of the hairs of which it is composed. Most probably two of these are the species with yellow dorsal spots, characterized by Hemprich and Ehrenberg, viz. *Hyrax syriacus* or *sinaiticus* of Asia, and *H. ruficeps* vel *dongolicus* of Africa.

Two of these species have rather harsh rigid hairs.

Three specimens of the first were sent from upper Egypt by Mr. James Burton. They are larger in size and much paler in colour than the other species of the group, and very slightly punctulated with black. They have the dorsal streak comparatively slightly marked and of a pale colour, and the fur is short and close. There is a single young specimen, received from a French collector as from Senegal, very like those from Egypt, showing that this species has a very wide distribution in Africa.

The second, of an iron-grey colour, was brought from Angola by Dr. Welwitsch. Dr. Peters names it *H. arboreus*; but it is quite distinct from that species. I have called it *H. Welwitschii*.

The other three species have very soft close fur; and they differ from one another in the colour of the fur and of the separate hairs. The first, which I believe is the Ashkoko of Bruce, is very like a wild rabbit in general colour, and is white below; the hairs have a black subterminal band and a yellow tip, which gives the fur a minutely and closely punctulated appearance. The second is somewhat like the former, and also said to come from Abyssinia; but the fur is pale yellow-grey, minutely and slightly varied with black hairs, but not punctulated, and the hairs have no subterminal band; and the underside is yellowish. The third, which is the species found in Palestine and Arabia, is of a nearly uniform reddish-yellow colour, and has longer and softer hairs of a nearly uniform colour.

Sir Andrew Smith, in the Trans. Linn. Soc., described a South-African species under the name of *H. arboreus*; and Mr. Fraser described a West-African species under that of *H. dorsalis*. Both these

species are distinguished by having a white dorsal spot. The type specimen described by Mr. Fraser, and a young specimen received from Sir Andrew Smith of his *H. arboreus*, are in the British Museum.

M. Blainville and other French zoologists have confounded the *H. dorsalis* of West Africa with the *H. arboreus* of the Cape, which are most distinct species, as proved by the types in the British Museum. Dr. Peters described the *H. arboreus* as found on the coast of Mozambique and also in the interior at Tete.

The animals with the white dorsal spot have a very different skull and teeth from the other species, which have a black or yellow dorsal spot. Sir A. Smith observed the peculiarity of the teeth when he described *H. arboreus*.

The colour-spots on the back consist of the hair that covers the situation of a dorsal gland on the vertebral line, about halfway between the shoulders and the pelvis.

In the species which have the hair yellow or white the streak is generally narrow and linear; in the species in which the spot is black it is generally broad and diffused. In some specimens of *H. sinaiticus* the yellow streak is deeper and brighter-coloured than in others. It appears more marked in the younger and smaller specimens in the British Museum than in the larger and older ones; and it is rather indistinct in the two skins which I believe may be *H. ruficeps* from Abyssinia.

Professors Hemprich and Ehrenberg proposed to use the form of the interparietal bone as a distinctive character for the species: thus they described it as large and trigonal in *H. capensis*, small and pentagonal in *H. syriacus*, large and nearly tetragonal in *H. ruficeps*, and large and semiorbicular in *H. habessinicus*.

M. de Blainville, in the 'Ostéographie,' "Onguligrades," figures the hinder part of the skull of three species to show the interparietal bone; he figures it as elongate and subtriangular in *H. syriacus*, large, broad, and roundish four-sided in *H. capensis*, and very broad in *H. ruficeps*. The part figured as the interparietal in the last species is the broad upper edge of the occipital bone.

Dr. G. v. Jaeger, who has several skulls from the Cape, collected by Dr. Ludwig, and from North Africa by Dr. Heuglin, has written an essay to show that the interparietal bone of the same species varies much in form and size; he figures ten varieties of it in *H. capensis* and three in *H. habessinicus*. He seems to have confounded two species under the latter name; for fig. 14 is evidently a *Dendrohyrax*, Dr. Jaeger having mistaken the broad upper edge of the occipital bone for an interparietal: he also figures the interparietal of a species sent from West Africa by Mr. Dieterle, which he names *H. sylvestris*, which is also a *Dendrohyrax*; but the interparietal is of a very different shape from those of the two skulls of the West-African *D. dorsalis* in the British Museum.

Dr. Jaeger shows that the interparietal is variable in shape in *Cavia aguti* (Würzb. naturw. Jahresb. 1860, xvi. p. 158, t. 2).

There is considerable difference in the form of the bladebone in



the genera *Hyrax* and *Dendrohyrax*. In *Hyrax* (Nos. 724*b*, 724*g*, & 724*h*) it is elongate, half as long again as broad, with a short, broad process at the lower side of the condyle. In *Dendrohyrax* (No. 1142*b*) the bladebone is broad, irregular, four-fifths as broad as long, with an elongate compressed process on the lower side of the condyle; the lower edge of the bone in *Hyrax* is sloping for half its length, and then nearly straight; in *Dendrohyrax* this edge is arched from the condyle to the end, the broadest part being near the middle of the lower edge (see Cuvier, *Oss. Foss.* t. 3. f. 1; Blainville, *Ostéogr.* t. 3). The following are the measurements, in inches and lines:—

	<i>Hyrax</i> , 724 <i>b</i> .		<i>Dendrohyrax</i> , 1142 <i>b</i> .	
Length of upper edge . . . . .	2	2	1	9
„ lower edge . . . . .	2	1	1	7
Width at widest part . . . . .	1	7	1	6

Skulls with the teeth in change show the milk and permanent cutting-teeth at the same time, thus having four upper cutting-teeth. A skull with teeth in this state is figured by Cuvier (*Oss. Foss.* ii. p. 135, t. 2. f. 5).

In most skulls there is a small hole on each side near the back edge of the cutting-teeth, which Cuvier calls the *trous incisifs* (t. 2. f. 2*n*); see also Jaeger, *Würzb. naturw. Jahresb.* 1860, xvi. t. 2. f. 20*x*, who regards it as the remainder of a deciduous second cutting-tooth. This pit is less distinct and nearer the base of the cutting-teeth in the skull of *Dendrohyrax*.

Professors Hemprich and Ehrenberg propose as a specific character the length of the feet compared with the tibiæ; but this is difficult to observe in dried specimens or in set-up skeletons, as the length of the feet must depend greatly on how the specimens are mounted.

It is the fashion with certain naturalists (as M. Claparède, for example) to find fault with zoologists for describing specimens in museums; but, as far as mammalia are concerned, it is much more difficult to describe them from living specimens; for then one cannot observe their teeth and bones, or compare many specimens with one another, and can rarely have the opportunity of comparing several species at the same time,—all much greater evils than not being able to tell the sex &c. of the specimens contained in museums. I must say that I think the accusation that “museums are a great incubus to science” must have arisen from the naturalist making it taking a very limited view of the subject. Museums may cause some evil (what does not?); but the advantages of a large collection far exceed any evil I have ever experienced or can ever conceive to arise from them.

The species may be thus arranged:—

1. HYRAX.

a. Dorsal spot black. . . . 1. *Hyrax capensis*. South Africa.

b. Dorsal spot yellow.

\* Fur harsh. . . . . 2. *Hyrax Burtonii*. North and West Africa.  
3. *Hyrax Wehweitschii*. Angola.



- \*\* Fur soft ..... 4. *Hyrax Brucei*. Abyssinia.  
 5. *Hyrax Alpini*. Abyssinia?  
 6. *Hyrax sinaiticus*. Sinai.  
 7. *Hyrax ferrugineus*. Abyssinia.  
 8. *Hyrax irrorata*. Abyssinia.  
 9. *Hyrax Bocagei*. Angola.  
 2. EUHYRAX ..... 1. *Euhyrax abyssinicus*. Abyssinia.  
 3. DENDROHYRAX ..... 1. *Dendrohyrax dorsalis*. West Africa.  
 2. *Dendrohyrax arboreus*. South Africa, Tete.  
 3. *Dendrohyrax Blainvillii*. (Skull only.)

## 1. HYRAX.

Skull with a distinct narrow sagittal crest on hinder part of crown when adult; nose short. Diastema short, not equal in length to the outer sides of the first three premolars; grinders in an arched line; molars large, broad, square, much larger and broader than the compressed premolars, the first one very compressed. Orbit incomplete behind. Lower jaw very broad behind. Bladebone elongate trigonal.

Skull—nose short; forehead flat or rather convex below the orbit; orbit incomplete behind; the lower jaw much dilated behind. The diastema between the canines and the first premolar short, not so long as the outer edges of the first three premolars. Lower cutting-teeth elongate, narrow at the base, broader above, with three lobes; but the lobes are soon worn away, only leaving indistinct grooves on the surface of the teeth. The lobes of the lower cutting-teeth are distinct in the very young animals which have not yet cut their premolars and last grinder. The upper cutting-teeth of the milk series are rounded in front, broad and spatulate at the end; those of the adult series are trigonal, with a strong central keel in front. The grinders form an arched series; the true grinders large, much larger than the rather compressed premolars; the first (permanent) premolar (that is, the second in the series) small, compressed; the first premolar in the upper jaw of the milk series is triangular, with three roots, the two hinder ones being close together.

*Hyrax*, Gray, *Ann. & Mag. N. H.* ser. 4. i. p. 40.

De Blainville, in the 'Ostéographie,' figures the skeleton and the skull of a species of this genus under the name of *Hyrax syriacus*; but I am not able to determine to which of the species of this genus it belongs. *H. syriacus* has almost a generic signification.

The skull in the British Museum (725 c) that agrees with De Blainville's figure of the interparietal bone of *H. syriacus* is rather larger and has the front upper premolar rather larger than the skulls of *H. capensis* according with the same distinctive mark, viz. 724 b, 724 c, and 724 d, which were all received from the Zoological Society without skins; and the hinder openings to the nostrils are more contracted in those named *H. capensis* than in *H. syriacus*.

De Blainville (Ostéograph. t. 2) figures the skull of the very young *Hyrax capensis* as having all the four lower cutting-teeth three-lobed.

They are so in a young skull so named in the British Museum ; but the lobes are much less distinct and narrower than in skulls of the half-grown and adult *H. dorsalis* in the same collection ; and the lobes of *H. capensis* evidently wear away much sooner than in the Tree-Hyraces or *Dendrohyrax*.

The skulls named *Hyrae capensis* in the British Museum are without skins, and therefore cannot be determined with certainty ; they differ in the width of the forehead at the hinder edge of the orbits being greater compared with the length of the skull ; they differ considerably in the form of the flat space on the crown, even the skulls of adult animals.

No. 725 *c* (of Gerrard's Catalogue). The front of the crown is triangular, uniting into a very narrow sagittal crest level with a line over the condyles ; the teeth are very large, and the palate wide.

No. 724 *b*. Rather smaller and wider than 725 *c*, with the teeth equally large and the palate wide ; but the crown is flat, wider in front, becoming narrower and continued behind, and forming a smooth space above.

Nos. 724 *c* and *d* are smaller than either 725 *c* or 724 *b*. The teeth are very large, the nose is narrower and more compressed ; and they differ from both the above in the crown being wider and forming a broad band to the occipital crest. In 724 *d* the crown is only slightly broader in front, and more nearly of the same width throughout its length. In 724 *c* it is quite as broad behind as in 724 *d*, but much wider in front.

The interparietal bones of these two skulls are visible ; they are nearly four-sided, and the width of the crown similar to, but not so large as the interparietal bone figured by Blainville (Ostéograph. t. 2) as that of *H. capensis*.

There is the skull of a young animal, with the milk cutting-teeth, developing the second true molar, in the British Museum (724 *g*), that has the interparietal similar to those of 724 *c* and *d*, but considerably larger, though the skull is smaller, like the figure referred to in De Blainville.

The skeleton with a skull (724 *e*), in the British Museum, of a young animal with milk cutting-teeth, has a subtriangular interparietal, somewhat like that of *H. Burtonii*.

In the British Museum there is the skull and skeleton of a very young animal, received from the Zoological Gardens (No. 724 *h*), which is peculiar in having a very broad, half-oblong interparietal bone occupying the hinder edge of the crown, with only the narrow upper edge of the occipital bone behind it. The front edge of the interparietal is regularly rounded, and the hinder one straight. The orbit is incomplete. De Blainville figures a skull of a young specimen (Ostéog. t. 2) as *H. capensis* which somewhat resembles this skull. This skull, in the form of the interparietal, agrees with the nearly adult skull of *Dendrohyrax dorsalis* (No. 1142 *c*) ; but we have a skull of a very young animal of that genus in the Museum Collection which has the orbit complete and the upper part of the occipital bone dilated. This skull is so distinct from any other in



the collection that I propose to designate it provisionally *Hyrax semicircularis*.

The interparietal bone being on the edge of the occipital region of the skull is a character (as well as the incomplete orbit) that separates the skull of *Hyrax* from *Dendrohyrax*, even in the youngest state.

\* Dorsal spot black, well marked. Africa.

1. *Hyrax capensis*. (The Klipdas.)

Fur black, minutely punctulated with white, with a black dorsal streak.

*Hyrax capensis*, Schreb. *Säugeth.* p. 920, t. 240; Cuvier, *Oss. Foss.* ii. pp. 127, 141, t. 1, 2, 3; Gray, *List Mamm. Brit. Mus.* p. 187; Gerrard, *Cat. Bones Brit. Mus.* p. 283; Blainville, *Ostéograph.* t. 2 (teeth & skull); W. Read, *P. Z. S.* 1835, p. 13; Gray, *Ann. & Mag. N. H.* ser. 4. i. p. 42.

*Cavia capensis*, Pallas, *Misc.* pp. 34, 35; *Spicil.* ii. p. 22, t. 2.

Marmotte du Cap, Buffon, *Suppl.* iii. p. 177, t. 29.

*Hab.* South Africa, Cape of Good Hope (Dr. Andrew Smith).

*Var.* Dorsal streak indistinct.—Gray, *l. c.* p. 42.

Cape of Good Hope (Dr. Krauss). Skull and skeleton. B. M.

For anatomy, see Pallas, *Miscell. l. c.*; Owen, *P. Z. S.* 1832, p. 202; Martin, *P. Z. S.* 1835, p. 13; Murie, *P. Z. S.* 1865, p. 329. But I am by no means sure that several species may not be confounded under this name in these papers, as all the specimens formerly received at the Zoological Gardens were called *H. capensis*.

\*\* Dorsal streak yellow, linear.

a. Fur harsh.

2. *Hyrax Burtonii*.

Fur rather harsh, pale yellow-grey, very slightly punctulated with blackish; dorsal streak small, yellow; the hairs of the back rather rigid, black or dark brown nearly the whole length, with a moderate yellow tip; underside pale yellow; interparietal bone half-ovate, as long as broad.

*Hyrax syriacus*, Gray, *List Mamm. B. M.*

*Hyrax abyssinicus*, J. Burton, *MS. B. M.*; Gerrard, *Cat. Bones B. M.* p. 284.

*Hyrax Burtonii*, Gray, *Ann. & Mag. N. H.* ser. 4. i. p. 43.

*Hab.* North Africa, Egypt (James Burton, *Esq.*): three specimens and a skull in B. M. Senegal (*Parzudaki*): a young specimen in B. M.

The imperfect skull sent by Mr. James Burton from North Africa, with the skins, which I have named *H. Burtonii* (No. 725 b), is not quite adult, as the hinder or third upper true molar is not quite developed. It is very like No. 724 c in size, form, and in the form of



the crown; but the notch left by the interparietal (for it is lost with the hinder part of the skull) shows that that bone was of a half-oval shape and rather longer than broad, being rather wider but not near so long compared with its width as the interparietal figured as that of *H. syriacus* by De Blainville (*Ostéograph. t. 2*). This skull differs from those numbered 724 *c* and *d* in being higher behind when placed on its upper grinders, and in the forehead being slightly more convex in the middle below the orbit.

### 3. *Hyrax Welwitschii*.

Fur short, rather harsh, iron-grey-grizzled; hairs of upper part of the back black, with a large white subapical ring; of the sides dirty brown, with a white ring; dorsal streak yellow, moderate.

*Hyrax arboreus*, *Peters*, *P. Z. S.* 1865, p. 401 (not *A. Smith*).

*Hyrax Welwitschii*, *Gray*, *Ann. & Mag. N. H.* ser. 4. i. p. 43.

*Hab.* Rocky places on the shores of the river Maiomba, in the district of Mossamedes (*Welwitsch, l. c.*).

The adult skull of *H. Welwitschii*, lent to me by Dr. Welwitsch, differs from all the preceding in being considerably broader in proportion to its length. The nose is compressed, the crown is flat to the occipital ridge, wide in front, and gradually narrowing behind. The interparietal bone (which is partly destroyed by a hole made to extract the brain) is very small and nearly triangular; the teeth are large, and the palate rather narrow, compared with the other skulls. The diastema is very short, not exceeding the length of the outer side of the first two premolars. The shortness and width of this skull at once separate it from the skulls of all the species of true *Hyrax* that are in the Museum Collection. This species is only known from a flat skin and a skull collected by Dr. Welwitsch and named by Dr. Peters as above.

Dr. Peters, in a note to me, observes, "I probably made a mistake, and the *Hyrax* (*Proc. Zool. Soc.* 1865, p. 401) with rather harsh and short hair does not belong to *H. arboreus*, *Smith*. It has, if I am not mistaken, much shorter ears than *H. arboreus*; and therefore I said the *H. arboreus* has much shorter ears than *H. capensis*, which is not the case. Dr. Welwitsch's specimen resembles more the *H. habessinicus* of Ehrenberg in this respect, and may prove to be identical with that species."

I may add that it differs from *H. abyssinicus* in the skull, the short diastema, and the colour and nature of its fur. It is more allied to *H. Burtonii*, but differs in the colour of the fur. It is very difficult to state the size of the ears of the different species from stuffed or dried skins.

Dr. Welwitsch says, "It always differs by its larger size from a second species living in the interior of Angola." He probably refers to the species received from the Lisbon Museum, which I have called *H. bocagei*.

b. *Fur soft, close.*

#### 4. *Hyrax Brucei*.

Fur soft, close, yellow grey-brown, closely and minutely punctulated with black; underside white; dorsal streak distinct, dark reddish yellow; hairs of the back soft, dark grey-brown to the base, with a narrow subterminal blackish band and a yellow tip. Skull—"interparietal bone oblong, longer than broad."

Ashkoko, *Bruce's Travels*, t.

Daman d'Israël, *Buffon, Suppl.* vi. p. 276, t. 24 (from *Bruce*).

*Hyrax syriacus*, *Schreb. Säugeth.* iv. t. 240. f. 13 (from *Bruce*); *Blainville, Ostéograph.* t. 2 (skull and teeth).

*Hyrax abyssinicus*, *Rüppell, MS. B. M.*; *Gerrard, Cat. Bones B. M.* p. 284; *Burton, MS. B. M.*

?*Hyrax ruficeps vel dongolanus*, *Ehrenberg, Symbolæ Phys.* t. 2 (not *Blainville*).

*Hyrax Brucei*, *Gray, Ann. & Mag. N. H.* ser. 4. i. p. 44.

*Hab.* Africa, Abyssinia (*Dr. Rüppell*): type in B. M. ? Dongola (*Ehrenberg*): adult skull in B. M.

The name of *H. syriacus* cannot be retained for this species, as it does not come from Syria.

*Dr. Peters*, in a note which he sent to me respecting *Ehrenberg's* specimen in the Berlin Museum, observes, "His *Hyrax ruficeps* is hardly different from *H. syriacus*." By the second name which *Ehrenberg* gives to this species it evidently came from Dongola in Africa; so it can scarcely be the *H. syriacus* of *Ehrenberg* from Mount Sinai.

#### 5. *Hyrax Alpini*.

Fur very soft, rather long, pale yellowish brown, very slightly washed with blackish; hairs soft, of uniform length, blackish brown, with yellow tips, and a few scattered black hairs; lips, chin, throat, chest, belly, and inner sides of the limbs pale reddish yellow; hairs yellow to the base: crown and cheeks grizzled, with white tips to the hairs; hairs at the outer base of the ears yellow-white; dorsal spot small, reddish yellow.

*Hyrax Alpini*, *Gray, Ann. & Mag. N. H.* ser. 4. i. p. 45.

*Hab.* North America, "Abyssinia (*Leadbeater*)."

There is only a single specimen of this species in the British Museum; it was purchased in 1843, with the skin of a *Capra nubiana*, from Mr. Leadbeater, who said they came from Abyssinia. The special habitat may be doubtful; but there is no doubt they were from North Africa, and probably from the borders of the Nile.

It agrees with the *H. Brucei* of Abyssinia in the softness of the fur, but differs from it in its general colour, not being closely punctulated, and also in the separate hairs not having any indication of the subterminal black band that produces the punctulated appearance of the fur of that species; and the underside of the animal is yellower. It differs also from *H. sinaiticus* in the general colour



being much darker and slightly washed with black, and in the dark colour of the hairs.

*H. Burtonii*, which we received from Mr. James Burton, with specimens of *Capra nubiana*, is at once known from it by the rigid harshness of the fur, as well as by the colour of the hairs.

#### 6. *Hyrax siniaticus*.

Fur rather long, soft, pale yellow-brown; dorsal streak bright yellow; head and front slightly punctulated with whitish; chin, throat, and underside of the body pale reddish grey. "Interparietal bone small, pentagonal" (*Ehr.*).

*Hyrax syriacus vel siniaticus*, *Hemp. & Ehrenb. Symb. Phys.* t. 2, lower front figure (not *Schreber*).

Coney (*H. syriacus*), *Tristram, Nat. Hist. Bible*, p. 75 (not figured).

Uabr, *Forsk. Fauna*, p. 5.

*Hyrax sinaiticus*, *Gray, Ann. & Mag. N. H.* ser. 4. i. p. 45.

*Hab.* Asia, Palestine (*Tristram*): B. M. Arabia, Mount Sinai (*Ehrenberg*).

There is a young specimen in the British Museum, that was purchased at a sale with *Capra nubiana*, which appears to belong to this species; it has the same long hair and fur, showing no sign of the punctulation characteristic of the African species with a yellow dorsal spot.

Mr. Tristram gives a good account of the habits and manners of this animal in his interesting 'Natural History of the Bible,' published by the Christian-Knowledge Society.

#### 7. *Hyrax ferrugineus*.

B.M.

Fur soft, rather short, close, iron-grey, minutely punctulated with black and white; hinder part of body and rump rusty brown; hair of the back short, blackish to the base, with short grey tips; dorsal spot small, pale yellow, hair of the spot light yellow above and black at the lower half of its length; chin, throat, and belly greyish white, hairs sparse.

*Hab.* Abyssinia (*Jesse*).

Skull—length  $3\frac{1}{2}$ ; the crown with a broad flat space between the temporal muscles; teeth all developed.

#### 8. *Hyrax irrorata*.

B.M.

Fur soft, elongate, blackish, punctulated with grey; hair of the back long, blackish grey at the base, with a broad pale whitish ring, a broad black subterminal ring, and a well-marked white tip; chin, throat, and belly white; dorsal spot small, linear, pale yellow, hair of the spot elongate, yellow-white to the base.

*Hab.* Abyssinia (*Jesse*, "no. 1187").

Skull with the back cut off.

Var. *luteogaster* (B.M.). The chin, throat, and belly yellowish; the



hair of the tail less black at the base, and the subapical band narrower. Skull perfect, otherwise like the preceding.

*Hab.* Abyssinia (*Jesse*).

A second specimen, purchased of Mr. Jesse with the former, differs in the chin and underside of the body being yellowish, the fur longer, and the dorsal spot smaller.

There is a specimen in the British Museum, received by Brandt of Hamburg as *Hyrax syriacus*, said to be from Africa, that is very like the specimens from Abyssinia above described.

It is probable that they belong to a distinct species; but unfortunately Mr. Jesse's animals were received without any notes as to when and where they were obtained. I therefore wait for more material, and simply describe them as a variety.

\*\*\* *Dorsal streak linear, white.*

### 9. Hyrax Bocagei.

B.M.

Fur rather long, soft, pale grey; hair of back pale grey, blackish at the base, with a very narrow whitish subterminal band and minute black tips; nape paler; chin, throat, and underside of body white; dorsal spot linear, white, hair white to the base. Ears grey, black and naked at the tip.

*Hab.* Angola (*Bocage*, from the Lisbon Museum).

Skull with a long and very narrow compressed nose. Length of skull  $3\frac{1}{2}$  inches, width at back of orbit  $1\frac{5}{8}$  inch.

There is an indistinct very narrow variety with black rings round the upper part of the neck in front of the shoulders, formed by the crowded tips of the hairs of this part; but this may have been produced by the shrinking of the skin of the neck and the manner in which the animal is stuffed. This specimen, which was called *Hyrax arboreus*, is very distinct from all the other species of the genus *Hyrax* in the length and narrowness of the nose of the skull, and the whiteness of the dorsal streak.

## 2. EUHYRAX.

Skull with a distinct narrow sagittal crest the whole length of the crown when adult; occipital not dilated above; nose elongate, produced. Diastema elongate, longer than the length of the outer sides of the first three premolars; grinders in a nearly straight series; molars square, larger than the compressed premolars. Orbit incomplete behind.

*Euhyrax*, *Gray*, *Ann. & Mag. N. H.* ser. 4. i. p. 46.

The skull is very similar to that of *Hyrax syriacus*?, *H. Brucei*, *H. Burtonii*, and *H. capensis* in general form; but the space between the upper cutting-teeth and the first premolar is nearly twice as long as in those species. In the *H. Brucei* it is as long as the length of the outer sides of the first three premolars and the half of the fourth one; in *H. capensis* it is only as long as the outer sides of the first two premolars and one-third of the third one. The grinders are

large, the first upper one being compressed as in *H. capensis*; but they are all smaller, compared with the size of the skull, and are placed in a straighter line, than they are in the skulls of the other species named, and the inner sides of them are more nearly parallel, so that the palate is scarcely wider in the middle of the series of grinders than it is at the front and hinder ends of them. Lower jaw dilated behind. The bladebone elongate trigonal like that of *Hyrax*.

Mr. Gerrard, in his 'Catalogue of Bones of Mammalia in the British Museum,' pointed out that there is a distinction in the skeleton between this species and *H. capensis*. He states that the specimen 724 *a*, in his Catalogue, "has twenty-two pairs of ribs, the first of which are articulated to the last cervical vertebra, and five sternal bones," the *H. capensis*, 724 *b*, in the same collection having only twenty-one pairs of ribs and seven sternal bones. (See Cat. Bones, p. 283.)

It is well worthy of observation that all these osteological characters exist in two species scarcely to be distinguished by their skins. The skull of *Euhyrax abyssinicus* is intermediate between *Hyrax* and *Dendrohyrax*, but more allied to *Hyrax*.

#### *Euhyrax abyssinicus*.

Fur blackish, minutely punctulated with white, with a black dorsal spot.

*Hyrax habessinicus*, *Hemp. & Ehrenb. Sym. Phys.* (specific characters).

*Hyrax abyssinicus*, *Giebel, Mam.* p. 213.

*Hyrax syriacus*, *Hemp. & Ehrenb. Symb. Phys.* t. 2 (hinder figures only).

*Euhyrax abyssinicus*, *Gray, Ann. & Mag. N. H.* i. p. 47.

*Hab.* Abyssinia, Ankober, Dec. 1847 (male and female); called "Ashkoko" (*Capt. Cornwallis Harris*). B.M.

Ehrenberg describes the interparietal of *H. capensis* as trigonal, and of *H. habessinicus* as semiorbicular, and the space between the canine and grinders of *H. habessinicus* as being longer than in *H. capensis*; he also says that the fur of *H. capensis* is soft, and of *H. habessinicus* more rigid; but I cannot discover any appreciable difference in this respect between the Cape and the Abyssinian species.

The skull of the adult *Euhyrax abyssinicus*, from the Abyssinian skin, is larger than that of any species of *Hyrax*, and nearly as large as that of *Dendrohyrax dorsalis*; it is narrow, and the smooth space on the crown is linear, of nearly equal width from a line on a level with the front of the condyles.

The second skull (from the skeleton No. 724 *a*) which I believe to belong to this species has decayed grinders, having been kept in confinement. It is very like the type specimen, but it is rather shorter, and the hinder part of the crown or sagittal crest is narrower. This skull is exceedingly like the skull figured with its skeleton under the name of *Hyrax syriacus* by M. de Blainville (*Ostéograph.* t. 1 & 2). It differs from the figure a little in the form of



the process of the lower jaw in front of the condyle; but in this respect it also differs from the type specimens of *Euhyrax abyssinicus*. In both skulls the upper edge of the occipital bone is narrow, as in *Hyrax*.

Dr. Peters has, since the above was written, sent me the following observations on Professor Ehrenberg's specimen in the Berlin Museum:—"H. habessinicus is a very good species, and may prove to be the same as the *H. dorsalis*. There is a figure of a younger specimen in his work 'Symbolæ Physicæ,' Mammalia, pl. 2. f. 2, together with *H. syriacus*. As you will see from the text, the skull is quite different from that of *H. capensis*, *H. syriacus* (*ruficeps*), and *H. arboreus*. The zygomatic arch is lower than on its junction with the zygomatic process of the maxillary bones; but the teeth are small, as in *H. arboreus*. The hair is harsh, black and grey; and the hair of the belly is much shorter, greyish, sometimes yellowish, without soft fur."

"The skull of my specimen from the coast (regarded as *H. arboreus* in the 'Mammalia of Mossambique') agrees pretty well with that of *H. habessinicus* and with another skull sent by Heuglin from Abyssinia. I cannot understand how this species could be confounded with *H. capensis*."

*H. abyssinicus* cannot be *H. dorsalis*, as the former has a black and the latter a white dorsal spot, which is well marked in both species.

### 3. DENDROHYRAX.

Skull rather elongate, with a broad flat crown, separating the entire length of the temporal muscles in the adult animal; nose elongate, produced. Diastema elongate, longer than the length of the outer sides of the first three premolars; grinders and premolars in a nearly straight line, and nearly of the same form, the front premolar being only a little smaller. Orbit complete (or incomplete even in a mature skull).

Dendrohyrax, Gray, *Ann. & Mag. N. H.* ser. 4. i. p. 48.

Nose rather produced; forehead flat; temporal muscles moderate, separated in the adult skull by a broad flat crown; the upper edge of the occipital bone thick, broad, forming part of the crown; lower jaw broad, rounded behind. Lower cutting-teeth moderately long, rather contracted at the base; upper edge dilated and divided into three nearly square, rather spathulate lobes. The lower cutting-teeth are rather elongated in the older animal, but never so long and slender at the base as in the true *Hyraxes*. The upper cutting-teeth of the milk series are rounded in front, and obliquely truncated, spathulate at the end. The canine of the adult series is trigonal, with the keel in the front as in the true *Hyraxes*. The diastema between the canine and the first premolar, in the adult skull, is elongate, as long as the outer margin of the three premolars. The grinders form a very slightly arched series. The true grinders moderate, not much larger than the broad square premolars. The first permanent premolar nearly as large as the second one.



The skull of *Dendrohyrax dorsalis* may be known from those of *Hyrax* and *Euhyrax*, in the youngest state, by the large size of the half-oblong interparietal bone, which is nearly twice as wide as long. In the nearly adult skull it occupies the whole space of the hinder part of the crown. The skull of this genus is also peculiar for the upper part of the occipital bone being produced and expanded, and forming the hinder part of the crown, the hinder edge of the flattened part being keeled and sharply produced in the centre.

There is the skull, with only a few teeth, of a very young animal in the British Museum (No. 724 f) that agrees with the skull just described in having the upper part of the occipital bone broad and forming part of the crown, and in having complete orbits. It also has a very large, broad, transverse interparietal bone, nearly as wide as the convex crown of the skull; but this is four-sided, and twice as wide as high, as if formed of two squares united in the middle; the outer sides of the bone are rather angular in the middle. I suspect this is the young animal of *D. dorsalis*.

a. Orbit complete. *Dendrohyrax*.—Gray, l. c. p. 49.

### 1. *Dendrohyrax dorsalis*.

B.M.

Fur rigid, bristly, blackish; dorsal spot elongate, pure white. Young—fur soft, silky, reddish brown; back with a broad dorsal streak.

*Hyrax dorsalis*, Fraser, Proc. Zool. Soc. 1852, p. 99; Verreaux, Cat.

*Hyrax abyssinicus*, Read, MS. Mus. Zool. Soc.; Gerrard, Cat. Bones B. M. p. 284 (no. 725 a).

*Hyrax arboreus*, Blainv. Ostéogr. t. 2 (skull and teeth; not A. Smith); Gerrard, Cat. Bones B. M. p. 284.

*Dendrohyrax dorsalis*, Gray, Ann. & Mag. N. H. ser. 4. i. p. 49.

Hab. West Africa (*Verreaux*); Fernando Po (*Fraser*); Ashantee (*Read*).

There are two adult skulls of this species in the British Museum—one obtained from Fernando Po, and the other received from Mr. James Read, who obtained it from the cap of an Ashantee negro. In both the forehead is flat, rather concave between the orbits, and the orbits have a complete bony ring; they both agree exactly with the figure of the skull of *H. arboreus* in De Blainville's 'Ostéographie,' and with the skull without a lower jaw in the British Museum.

There are the skeleton and skull of a young specimen in the British Museum, purchased from Mr. Jamrach; and this skull agrees with the two adult ones in the concavity of the forehead over the orbits and the complete bony rings to the orbits.

### 2. *Dendrohyrax arboreus*. (The Boomdas.)

B.M.

"Fur reddish fulvous, varied with black; sides reddish white mixed with black; underside and inner sides of limbs whitish;

with a central white dorsal streak."—*A. Smith*. Young—fur very soft, long, abundant, dark black-grey, varied with paler grey; lips, chin, throat, underside of body, and inner sides of limbs white. Skull —?

*Hyrax arboreus*, *A. Smith*, *Linn. Trans.* xv. p. 468; *Peters*, *Mossamb.* p. 182? (not *Blainville*); *Kirk*, *P. Z. S.* 1864, p. 656?

*Dendrohyrax arboreus*, *Gray*, *Ann. & Mag. N. H.* ser. 4. i. p. 49.

*Hab.* South Africa (*A. Smith*): a young specimen with milk-canines, South Africa, from Sir Andrew Smith. Mossambique, Tete (*Peters*, *Kirk*).

There is no adult specimen of this species in the British Museum; there is a young specimen, with the milk-teeth, received from Sir Andrew Smith, the original describer of the species. It is so different from the young specimen of the West-African species received from M. Verreaux, which agrees with the adult tropical species described by Mr. Fraser, in the British-Museum collection, that there can be no doubt that the South- and West-African species are distinct, though the French zoologists and osteologists have confounded them.

The young specimen is at once known from the young of *D. dorsalis* by the paler colour of the fur, the want of the dark dorsal streak, and the whiteness of the under surface.

Dr. Peters, in his 'Mammalia of Mossambique,' says that *D. arboreus* is the only species of *Hyrax* he found in Mozambique. It occurs near the capital of Mozambique, on the coast, and at Tete in the interior, where it is called Mbira.

It would be interesting to know if this is the same as *H. dorsalis*, as the latter occurs at Ashantee.

Common on rocky hillsides, living in colonies. Caught by spring-traps; flesh good to eat (*Kirk*, *P. Z. S.* 1864).

Dr. Peters, in a note to me respecting the *Hyraces* mentioned in his 'Mammalia of Mossambique,' observes, "It may be that there are two species of *Hyrax* in Mossambique—one on the coast, and the other in the interior. From the coast I only got a female specimen: the skull of this species shows small grinders compared with those of *H. syriacus*, and seven in number." See further observations on this skull under *Euhyrax abyssinicus*. "The other specimen from the interior, the Carnera Hills near Tete, agrees perfectly with the *H. arboreus* from the Cape." This species is easily to be distinguished by its soft fur and want of rusty colour; the hairs of the underside are white, and brownish grey at the base.

b. *Orbit incomplete*. *Heterohyrax*.—*Gray*, *l. c.* p. 50.

### 3. *Dendrohyrax Blainvillii*.

*Dendrohyrax Blainvillii*, *Gray*, *l. c.* p. 50.

An adult skull in the British Museum (No. 724 e), without its lower jaw, was received from the Zoological Society without any habitat or history attached to it. It has small, more equal-sized



molars and premolars, in a nearly straight line, and the great length of the diastema which is so characteristic of this section of the genus. It may be the skull of the *D. arboreus* of South Africa. It differs from the skull of *D. dorsalis* in being small, in the forehead being convex in the centre between the orbits, and in the orbits being incomplete behind. It has the alveoli of the upper cutting-teeth each raised into a cup round the base of the tooth; but this may be only an individual peculiarity.

This skull has all the characters of the genus *Dendrohyrax*, except that the orbit is incomplete behind. I think that it indicates a new group, to which the name *Heterohyrax* may be given. The skull is much smaller and the tooth-line much shorter than in *D. dorsalis*; and I propose to name it provisionally *Heterohyrax Blainvillii*. The skull which M. de Blainville figures as that of *Hyrax rufipes* (Ostéograph. t. 2) exactly represents the hinder part of that in the Museum. It cannot be the *H. ruficeps* of Ehrenberg.

Dr. G. v. Jaeger figured, under the name of *Hyrax habessinicus* (t. 2. f. 14), the upper part of the skull of a *Dendrohyrax* obtained from Gondar by Dr. von Henglin. Dr. Jaeger, by mistake, figures the upper edge of the occipital for the interparietal. This skull is interesting as showing that the genus is found in Abyssinia.

Dr. G. v. Jaeger also figures the back of the skull and interparietal bone of a species he calls *Hyrax silvestris*, collected in West Africa by the missionary Dieterle. It is probably a *Dendrohyrax*. The hinder part of the figure is the upper edge of the occipital. The interparietal is urn-shaped, broader in front and contracted behind, very unlike that found in the skulls of either of the two species in the British Museum, and especially differing from *D. dorsalis* of West Africa; so it may be a new species of the genus, *Dendrohyrax silvestris* (Würzb. naturw. Jahresb. xvi. p. 162, t. 2. f. 15).

*The Measurements of the Skulls, in inches and lines.*

	<i>E. abyssinicus</i> , 725 d.	<i>E. abyssinicus</i> , 731 a.	<i>Hyrax</i> , 735 c.	<i>Hyrax</i> , 734 b.	<i>Hyrax</i> , 734 d.	<i>Hyrax</i> , 724 c.	<i>H. Barlonii</i> , 725 b.	<i>H. Waldeckii</i> .	<i>Hyrax</i> , 724 g (junior).	<i>H. semicircularis</i> , 734 h.	<i>D. dorsalis</i> , 1142 a.	<i>D. dorsalis</i> , 1142 c (junior).	<i>D. dorsalis</i> , 724 f.	<i>D. Blainvillii</i> , 724 e.
Length of skull .....	4 0	3 7	3 6	3 6	3 2	2 11	.....	3 2	2 7½	2 2½	4 0	3 4	2 1	3 4
" tooth-line .....	1 6	1 4½	1 6	1 6	1 4	1 2	.....	1 8	.....	.....	1 7	.....	.....	1 2½
Width, at centre of zygoma, of fore- head .....	2 2½	2 0½	2 0½	2 1	1 9	1 8½	1 8	2 0	1 7	1 3	2 3	1 10	1 2½	1 11
Width at back end of orbit .....	1 7	1 6	1 6	1 6	1 3	1 3	1 2½	1 6	1 2	1 0	1 9	1 6½	1 0	1 5½
Width of band at middle of crown over condyles .....	0 3	0 2	0 0½	0 6	0 6	0 7	0 6½	9 8	.....	.....	0 9	1 0	.....	0 10
Width of nose .....	0 7	0 7	0 8	0 7	0 6	0 5½	0 7	0 6½	0 6	0 5	0 8½	0 7	0 5	0 7
" at outer edge of tooth-line, at first molar .....	1 3	1 2	1 4	1 2	1 1	1 0½	1 0	1 0½	0 10½	0 9	1 2½	1 0	.....	0 11½
Width of palate at first molar .....	0 7½	0 7½	0 8	0 7	0 6	0 7	0 6½	0 6½	0 6	.....	0 9	0 8	.....	0 6



## Suborder IV. NASICORNIA.

Nose rounded, with one or two horns, on a central line, formed of agglutinated hair. Upper lip prehensile. Cutting-teeth of upper jaw rudimentary or wanting, of lower jaw unequal, shelving; outer one elongate, projecting; central ones cylindrical, deciduous. Toes 3.3, nearly of same length, radiating, more or less free, all reaching the ground.

Nasicornia, Illiger, *Prodr.* 1811.

## Fam. 4. RHINOCEROTIDÆ.

Nose simple, with one or two horns on the central line. Upper lip subprehensile. Toes three or five, united into a broad clavate foot, each with a separate broad nail-like hoof. Teeth:—Incisors variable or wanting, C.  $\frac{0}{0}$ .  $\frac{0}{0}$ , P.M.  $\frac{1}{4}$ .  $\frac{1}{4}$ , M.  $\frac{3}{3}$ .  $\frac{3}{3}$ , =28. Molar teeth with distinct roots.

Rhinocerina, Gray, *Ann. Phil.* 1825; *Cat. Mamm. B. M.* p. 186.

Rhinoceroten, Giebel, *Säugeth.* p. 191.

Rhinocerotidæ, Owen, *Odont.* p. 587; Schinz, *Syn. Mamm.* ii. p. 332, 1845.

Rhinoceratina, Bonap. *Prodr. Mast.* p. 11; Gray, *Ann. Phil.* 1828.

Rhinocerosidæ, Lesson, *N. Tab. R. A.* 1858.

Rhinocerotidæ, Gray, *P. Z. S.* 1867, p. 1005.

*Synopsis of the Genera.*

- I. *The skin divided into shields by well-marked folds. Skull with the intermaxillary free, elongate; upper cutting-teeth long; nasal bones produced, conical. Asiatic Rhinocerotæ.*
  1. RHINOCEROS. Horn single, anterior. Lumbar and neck-folds of the skin well developed. Part of the occipital bone, near the occipital condyle, and the condyles themselves prominent.
  2. CERATORHINUS. Horns two, one behind the other. Lumbar and neck-folds of the skin rudimentary. Occipital end of the skull flat. Condyle not prominent.
- II. *Skin uniform, not divided into shields. Horns two. Skull—internasal cartilaginous; intermaxillary free, very small; upper cutting-teeth none; nasal bones broad, rounded. African Rhinocerotæ.*
  3. RHINASTER. Head short, compressed; upper lip with a central prominence. Skull short behind; occiput erect; nasal bones rounded in front; lower jaw thick in front; grinders small, in arched series.
  4. CERATOTHERIUM. Head elongate, truncated; upper lip square. Skull elongate and produced behind; occiput erect, produced above; nasal bones broad, convex, truncated and sharp-

edged in front; lower jaw tapering in front; grinders large, in straight lines.

III. *Skin uniform, not divided into shields. Horn single. Skull—internasal bony; nasal, internasal, and intermaxillary all united into one mass. Asia and Europe.*

#### 5. Cœlodonta.

The *Rhinoceroses* of Asia and Africa are known by the conformation of their jaws. The African species are easily distinguished by the form of the head and of their nose-horns. The species of Asia, on the other hand, are very difficult to separate from each other by any external character, and are only to be characterized by the form of their skulls and the locality which they inhabit, each zoological district having a peculiar species; and very probably there are yet species to be described, as the *Rhinoceroses* of China, of Beloochistan, and other countries which have not been examined by zoologists.

The British Museum contains a good series of preserved specimens of this family, and a large series of skeletons, skulls, and horns; and there is also a very rich collection of skulls from different localities in the Museum of the Royal College of Surgeons,—the two collections affording good materials for the revision of the species of this group. I have to thank the Council of the College of Surgeons, and Mr. Flower, the energetic Curator of their Museum, for their kindness in allowing me to examine the skulls in their collection.

In the British Museum there are specimens of five species, viz. one *R. unicornis* and two *R. javanicus* from Asia, and four specimens from Africa (viz. two *R. bicornis*, one *R. sinus*, and one *R. keitloa*), the three latter species being the animals that were collected and preserved under the superintendence of Sir Andrew Smith.

The Indian species (*R. unicornis*) has been often figured from life, amongst others by Dr. Parsons, in the 'Phil. Trans.' 1742, 1743, t. 1, 2; *R. sumatranus* by Mr. Bell from life in the 'Philosophical Transactions;' and *R. javanicus*, by Dr. Horsfield; and the two latter also by Solomon Müller, in his 'Verhandlung,' who gives good figures of the adult and young.

Three African species have been well figured by Dr. Andrew Smith, in his 'Illustrations of the animals of South Africa,' and two of them by Capt. Cornwallis Harris, in his 'Portraits of the Wild Animals of South Africa,' t. 16 & 19; so that the external appearances of these animals are well known.

The osteology of the species has been well represented by Camper, by Pallas (in 'Nov. Com. Petrop.' 1777), by Cuvier (in the second volume of his 'Ossemens Fossiles'), and further illustrated in De Blainville's valuable 'Ostéographie.'

In the British Museum there are three skeletons and ten skulls of the Asiatic species, and a skeleton and four skulls of the African *Rhinoceroses*.

The osteological collection in the British Museum is quite a modern creation, and has been made under great difficulties and with



very limited funds. The Trustees at first objected to have any skulls or other bones; but it was proved to them that mammalia and other vertebrates could not be studied without a collection of skulls. The fact was, one of the Trustees, Sir R. Inglis, was also a Trustee of the Hunterian Collection (certainly offices that are not incompatible with each other; for my uncle, Dr. E. W. Gray, one of my predecessors in my present office, was, on the purchase of the Hunterian Collection, named one of the Trustees); and he stated to me that he was urged to prevent the collection of osteological specimens in the British Museum, as being a rival and injurious to the collection at the College of Surgeons. The difficulty was to a great extent removed when Mr. Bryan Hodgson offered the Museum his very large collection of skins and skeletons from the Himalayas, which were to be accepted together or declined together. Since that time the collection has rapidly increased, and, though it was much depreciated by Professor Owen in his evidence before the Royal Commissioners on the affairs of the British Museum, was then, and I believe is now, the best-determined and largest osteological collection in Europe. As to the rivalry, if any exists, it is to the benefit of both collections, for it is conducive to the activity of the Curator of each; but I have always felt, and the present Curator of the Museum of the College of Surgeons believes, that they are able greatly to assist each other. I only know that I take almost as much interest in the collection of the College as in that under my own care.

In the British Museum there is a skull belonging to the Indian one-horned type; it is the skull of a young animal with premolars of the milk series and the first permanent grinder appearing. It is considerably larger than the skulls of the Indian species of the same age, and therefore indicates a species fully as large as that animal. The skull is so different from that species in its compressed form and proportions that there can be no doubt that it belongs to a very distinct species, which has not before been observed. There are also two skulls from Borneo, which belong to a distinct and hitherto undescribed species.

The Museum of the College of Surgeons contains two skeletons and thirteen skulls of the Asiatic and three skulls of the African *Rhinoceroses*. One of these skulls is very interesting; it belongs to the one-horned Indian group, and is much like that of *R. unicornis* in general characters. It is an adult skull, with all the permanent teeth; and it is so much smaller than the skull of the adult or even a half-grown animal of that species, that it indicates an animal not more than half, or perhaps one-third, of the size of the common Indian Rhinoceros.

There are generally one or more skulls of the animals of the genus to be seen in the larger local museums, as, for example, at Manchester, Leeds, and York. If these skulls could be collected together and compared, they would form a most interesting collection for study; unfortunately they are generally without any certain history as to habitat &c.

Cuvier, in his essay above quoted, has given an excellent *résumé*



of the history of the former knowledge of the animals; and I have only to observe that he did not discover that the skull figured by Camper, which he copied (t. 2. f. 7) and regarded as the skull of the adult *Rhinoceros bicornis*, is the skull of the *Rhinoceros keitloa*. He mentions *R. sinus* as a distinct species, from M. de Blainville's note on the animal (from Mr. Burchell's MS.) in the 'Journal de Physique.'

The horns of these animals attracted the attention of Dr. Parsons, who figured several of them in a paper in the 'Philosophical Transactions' for 1742 and 1743, among the rest the horns of some African species, which have, since Cuvier's time, been determined, chiefly by the form of the horn, to be distinct species. Some of these horns are still in the British Museum.

t. 3. f. 4, 5. *Rhinoceros bicornis*, in B. M.

t. 3. f. 6. *Rhinoceros sinus*, in B. M.

t. 3. f. 7. *Rhinoceros Oswellii*, in B. M.

t. 3. f. 8, 9. *Rhinoceros keitloa*?

In the British Museum and in the Museum of the College of Surgeons there is a large series of the horns of both the Asiatic and African species.

I. The ASIATIC RHINOCEROTES. Skin divided into shields, separated by distinct folds. Nose-horn single, or with a small second hinder one; nasal bones produced, conical, acute; internasals cartilaginous; intermaxillary well developed, free; upper cutting-teeth two, compressed, well developed. Lower jaw attenuated in front, with a straight lower edge. Teeth 34:—I.  $\frac{1}{2}$ .  $\frac{1}{2}$ . C.  $\frac{0}{0}$ .  $\frac{0}{0}$ . P.M.  $\frac{4}{4}$ .  $\frac{4}{4}$ . M.  $\frac{3}{3}$ .  $\frac{3}{3}$ .—Gray, P. Z. S. 1867, p. 1006.

*Rhinoceros*, § 2, Giebel, p. 205.

*Rhinoceros*, Gray, *List. of Mamm. B. M.* 1840.

*Rhinoceros* munit de dents incisives, Cuvier, *Oss. Foss.* ii. p. 89.

The British Museum has a series of skulls of the four Asiatic species, showing the form of the skull in the different ages of the animal, from the just born to the adult or senile state.

There is a considerable difference in the form of the skull between the species which has one and that which has two horns, especially in the form of the occipital end of the skull and in the size of the occipital condyles. The difference is well represented in Bell's figure of the skull of the Sumatran animal.

I at first had a difficulty in distinguishing the difference between the skulls of the Javan and Sumatran species; but this arose from the British Museum having received from the Leyden Museum, through Mr. Franks, a skeleton of the Javan species under the name of *R. sumatranus*. But when I received a skull of the two-horned species from Pegu, the mistake in the name of the skeleton was soon discovered.

Some of the specimens of skulls of *R. unicornis* and *R. javanicus* in the British Museum have the foramen in the front of the orbit over

the front and others over the hinder edge of the second premolar. In both the specimens of *R. sumatranus* it is over the back edge of the first premolar.

The first premolar in the three adult specimens of *R. unicornis* is smaller than the same tooth in *R. javanicus*, and appears to be earlier shed; for in two of the skulls it has entirely disappeared with the alveolus that contained it, and in the other one the tooth is there, but it is nearly rootless and the alveolus is nearly absorbed.

The two large lateral lower cutting-teeth have a sharply keeled inner edge; but the teeth often wear almost entirely away, so that this form is lost.

The grinders of the milk or first series have much larger and more equal folds on the outer side than those of the permanent set; in the latter the front fold is linear and near the front margin of the tooth.

The teeth in some specimens appear to be rather smaller than in others; but there is a difference in the comparative size of the teeth with regard to each other in the series.

As to presence or absence the small central lower incisor teeth seem to be liable to considerable variation. In one adult skull from India there are two incisor teeth; and in another there are two holes, but they are crowded together and are closing up.

In three specimens of *R. javanicus* there are no central lower incisor teeth, nor space for them; between the two large ones in the two other skulls, which are from younger animals, the central lower incisor teeth are well developed and cylindrical, being much the largest in the smaller and younger specimen.

The lachrymal bone varies in the different species, and is very characteristic. In *R. javanicus* and *R. nasalis* it is large, roundish, nearly as wide as high. In *R. unicornis* and *R. stenocephalus* it is narrow, oblong, erect, about twice as high as wide. In *Ceratorhinus sumatranus* it is very large, rather irregular-shaped, forming a considerable part of the cheeks of the skull. It differs a little in size and form in the specimens of the same species, but retains its general and distinctive forms.

There is a considerable variation in the size and form of the cavity under the zygomatic arch in the skulls that appear to belong to the same species. Thus in the four specimens of *R. unicornis*, which are nearly adult, two of them have the cavity short and broad, and two long and narrow. The same may be observed in the skulls of *R. javanicus* and *R. nasalis*. The aperture is widest, compared with its length, in the oldest specimens. This may probably be a sexual distinction; one of the skulls with a short wide opening is known to have belonged to a male. The size and form of the cavity is, no doubt, greatly influenced by the age of the animal. The masseter muscle becomes thicker and shorter as the animal increases in age, the transverse width of the skull under the muscles becoming less as the animal becomes more aged (see some measurements, showing the fact, under *R. javanicus*). The same is shown to be the case in the series of skulls of *R. unicornis*.



Mr. Edward Blyth has published a memoir on the living Asiatic species of *Rhinoceros*, with figures of some of the skulls in the Museum of the Society, which may be consulted with advantage (see *Journal of the Asiatic Society of Bengal*, xxxi. 1862, p. 151); but unfortunately I have not had the opportunity of comparing the skulls with those in the London collections:—

*Rhinoceros indicus*: narrow type of skull, t. 1. f. 1, t. 2. f. 1.

*R. sondaicus*: broad type of skull, t. 1. f. 2, t. 2. f. 2, from the Bengal Sundarbans and Tenasserim; t. 1. f. 3, t. 2. f. 3, aged, from Java.

*R. sumatranus*, t. 3. f. 1, 2 (male), t. 3. f. 3 (female).

*R. sumatranus*, Tavoy, t. 4. f. 1–4.

The figures are from photographs, and they show the form of the occiput in the three species, confirming the fact that the occiput of the two-horned species is always flat and erect.

### 1. RHINOCEROS.

Skin divided into distinct shields by deep folds. Lumbar fold well marked, and extending from the groin to the back. Horn one, short, conical. Upper lip with a central prominence. Skull:—forehead broad, flat, or only slightly rounded; the occipital end shelving from the occipital condyle to the occipital crest; the occipital condyles large, oblong, very prominent; lachrymal bone moderate.

The skulls of the larger number of species of this genus have the forehead and the upper surface of the nose flattened; this is seen in the living animal. But one species, of which there is only a single skull of a young animal in the British Museum, has the forehead and nose subcylindrical (that is, high on the central line and arched on the sides), as is the case with the Sumatran and the African *Rhinoceroses*. This character, I have no doubt, is equally visible in the living animal.

#### A. Forehead and nose behind the horn flat.

Nose square on the sides above; nasal short..... *R. javanicus*.

Nose shelving on the sides above; upper jaw slightly contracted before the grinders.

Nasal broad, elongate ..... *R. unicornis*.

Nasal narrow, short ..... *R. nasalis*.

Upper jaw much contracted before the grinders; nasal narrow, short ..... *R. Floweri*.

#### B. Forehead and nose subcylindrical, shelving on the sides above; nasal elongate ..... *R. stenocephalus*.

A. *The forehead and the nose behind the base of the horn flat, both in the living animal and skull.* Eurhinoceros.—Gray, P. Z. S. 1867, p. 1009.

\* *Upper jaw slightly contracted in front of the grinders.*

#### 1. *Rhinoceros javanicus*. (Javan Rhinoceros.) B.M.

Skull broad; forehead behind the horn broad, flat, or slightly



concave, obscurely keeled on the sides near base of horn; intermaxillary bone elongate, slender, straight, without any upper process; lachrymal bone roundish, nearly as wide as high; nasal bones not quite two-fifths of the entire length of the nose and crown.

*Rhinoceros javanicus*, *F. Cuv. et Geoff. Mam. Lith.*; *Gray, Cat. Mamm. B. M.*; *Solom. Müller, Verh.* t. 33 (♂ ♀); *Gray, P. Z. S.* 1867, p. 1009.

*Rhinoceros javanus*, *Blainv. Ostéogr.* t. 1 (skeleton), t. 2 (skull, adult and jun.), t. 7 (teeth).

*Rhinoceros sondaicus* (*R. unicorn* de Java), *Cuvier, Oss. Foss.* ii. p. 33, t. 14. f. 2 (skull), t. 17, 18 (skeleton); *Raffles, Trans. Linn. Soc.* xiii.; *Horsf. Zool. Java*, t. (animal); *Blyth, Journ. Asiat. Soc. Bengal*, xxxi. 1862, p. 151, t. 1. f. 2, 3, t. 2. f. 2, 3 (skull?).

*Hab.* Java. Skull of type from Mus. Leyden.

In the British Museum there are three skulls belonging to this species:—

1. A skeleton of an adult animal with a skull, purchased from the Leyden Museum, from Java.

2. An adult skull, received from the Zoological Society.

3. A skeleton with the skull of a half-grown animal, received from the Leyden Museum through M. Franks as *R. sumatranus*, from Sumatra. The skull agrees in all particulars, especially in the form of the occiput and the concavity and breadth of the forehead and nose, with the adult skull of *R. javanicus* from Java; so that there must have been some mistake in the name and habitat; perhaps the wrong skeleton was sent.

There is also an adult skull which has had the nasal bone cut off (722*h*), which was received from the Zoological Society under the name of *R. unicornis*; but I have little doubt it is a *R. javanicus*, perhaps from Sir Stamford Raffles.

In the oldest skull (723*d*) the aperture under the zygoma is 3 inches 7 lines wide in the widest part, and 4 inches 9 lines long. In the adult skull (723*a*) the aperture is 3 inches wide and 6 inches 1 line long. In the skull of the young specimen (723*e*) the aperture is 2 inches 2 lines wide, and 4 inches 7 lines long. The greater width is produced by the skull under the zygoma becoming so much narrower as the animal becomes aged. In 723*d* this part is only 4 inches 7 lines, and in 723*a* it is 5 inches 9 lines wide.

In the Museum of the Royal College of Surgeons there are *five* skulls that appear to belong to this species, but one or two of them are in a bad condition (nos. 2970 and 2971, the rest are not numbered).

Camper, who paid great attention to this species of Rhinoceros, in a letter to Pallas, printed in the 'Neue nord. Beyträge' (vii. p. 249), first pointed out that there were two Asiatic one-horned Rhinoceroses with upper incisors. His specimen, by the misfortunes of war, fell into the hands of Cuvier, and was described by him in the 'Ossemens Fossiles' (ii. p. 26). Cuvier regards the height of the occipital arch and the want of the apophysis on the upper edge of the intermaxillary as the chief character of the Javan species; but the apophysis

is generally absent in the Indian species, it appears only to be found in the skulls of the very old males of that kind.

## 2. *Rhinoceros unicornis*. (Indian Rhinoceros.) B.M.

Skull:—Forehead broad, flat, concave; nose behind the horn convex, subcylindrical, rounded at the sides; lachrymal oblique, longitudinal, oblong, rather four-sided; intermaxillary bones broad, thick, with a bony process on the middle of the upper edge; nasal bones short, broad, about two-fifths of the entire length of the nose and crown; zygomatic arch of the adult rather convex.

*Rhinoceros unicornis*, *Linn. S. N. i.* p. 104; *Gray, List Mamm. B. M.* p. 186; *P. Z. S.* 1867, p. 1010; *Gerrard, Cat. Bones B. M.* p. 286; *Cuvier, Oss. Foss. ii.* t. 4. f. 1; *Blainv. Ostéogr. t.* 2 (skull, adult).

*Rhinoceros asiaticus*, *Blumenb. Handb.* p. 10, *Abbild. t.* 7 B.

*Rhinoceros indicus*, *Cuv. Mém. Mus. t.*; *Oss. Foss. ii.* p. 5, t. 1-4 (bones); *F. Cuv. Mamm. Lithogr. t.*; *Schinz, Syn.* p. 333; *Owen, Cat. Osteol. R. C. S.* p. 513, nos. 2975 to 3074.

Indian Rhinoceros, *Parsons, Phil. Trans.* 1742-43, p. 525, t. 1, 2 (from life).

*Rhinoceros inermis*, *Lesson, Cat.*

*Hab.* India.

The skull figured by Cuvier and by De Blainville for the skull of *R. unicornis*, probably from the same skull in the Paris Museum, has a broad bony process on the middle of the upper edge of the intermaxillary bones. The skeleton and skull in the British Museum (722 g), from an adult male specimen that lived for several years in the Zoological Gardens, has this bony process well marked; so that it seems common in the species, if not a peculiar character of it.

Mr. Blyth thinks that "the adult male *Rhinoceros* that lived in the Zoological Gardens for several years, stated to have been captured in Arakan, was *R. sondaicus*." He proceeds, "The two Asiatic one-horned species, indeed, resemble each other a great deal more nearly in external appearance than the published figures of them would lead to suppose; certainly no sportsman or ordinary observer would distinguish them apart, unless attention had been specially called to the subject."—*Journ. Asiatic Soc. Bengal*, xxxi. 1862, p. 132. This explains how the species, now described for the first time, may have been overlooked.

In the British Museum there is the skeleton (722 g) with the skull of an adult animal that lived for several years in the Zoological Gardens, referred to by Mr. Blyth, and a skull from a just born animal, which was presented by Mr. Bryan Hodgson from Nepal.

There are in the British Museum other skulls which have been received from various persons without any special habitat that can be relied on, which appear to belong to this species. They are all without the process on the upper edge of the large thick intermaxillary bones.

1. A fully adult skull (722 d), marked "India?".

2. An adult skull (722 f) that was purchased of a dealer, without any specified locality.



In the Museum of the Royal College of Surgeons there is the skeleton of an adult animal (no. 2969 *a*) that formerly had the long front horns of an African Elephant placed on its nasal bones, which Mr. Flower, the present Curator, has properly removed.

There are also skulls of half-grown or female animals, with the seventh grinder just showing itself, of this species (nos. 2975, 2976), with a large oblong erect lachrymal.

All these skulls have thick intermaxillaries, and the front of the upper jaw, at the base of the intermaxillaries, is not suddenly contracted. In the three adult skulls it is 3 inches 9 lines wide; in the younger skull in the College of Surgeons (no. 2975) it is 3 inches 3 lines. The width of the diastema between the cutting-teeth and the front premolar is 2 inches 6 lines in all the specimens.

There is a stuffed specimen and a mounted skeleton of a young animal, just showing the horn, in the Free Museum at Liverpool, and the skull of a second of the same age. These two animals died on the voyage from Calcutta to Liverpool, were named *R. sondaicus* by Mr. Blyth, and preserved by Mr. Moore, the energetic Curator of that Museum. Mr. Blyth informs me there is a skeleton of *R. sondaicus* in the Anatomical Museum of Guy's Hospital, called *R. indicus*.

The Indian Rhinoceroses are long-lived. Mr. Blyth speaks of a pair that lived about forty-five years in captivity in Barrackpore park: they were exactly alike in size and general appearance; they never bred; there is no difference in the horns or form of the skulls in the two sexes (Blyth, J. A. S. B. xxxi. p. 155).

The foetal skull of *R. unicornis* (no. 722 D) in the British Museum, received from Mr. Bryan Hodgson, is short; the brain-case is oblong, ovate, swollen, and convex behind; the nasal bones are about as long as they are broad at the hinder edge, transversely convex above in the middle of their length and in the deep central groove in front above; the nasal cavity is long, high, and wide; the nasal bones are three-eighths of the entire length to the occipital crest; the length of the skull from the nasal to the front of the orbit is two-fifths of the entire length to the occipital condyles. The intermaxillaries are well developed, rather thick and short; they each bear two blunt teeth, scarcely raised above the alveolus, the first on each side is much larger and thicker than the hinder one, which is small and conical. There are three grinders developed on each side, the second and third being rather more developed than the small front one. There appears to have been a fourth tooth on each side more or less developed; but it and the cavity have been lost. The palate is narrow and deeply concave, nearly of equal width, but the sides are less erect and more expanded behind than in front; the front edge of the hinder nasal aperture is narrow, and rather in front of a line even with the hinder edge of the third grinder; the length of the palate from the front edge of the intermaxillaries is rather more than from the end of the palate to the suture between the basal sphenoid and the basal occipital bone. The vomer is compressed, and forms a well-marked broad ridge, which is much higher



in front, and divides the internal nostrils. The lower jaw has the incisors just developed, and slightly projecting beyond the alveolus; they are oblong, with a rather sharp edge on each side. There are cavities for four grinders on each side; the small first ones are lost; the second and third are equally developed, just projecting and with smooth enamel edges; and the fourth are being developed, the crown being sunk rather below the alveolar edge.

*Rhinoceros cucullatus* (Wagner, Schreb. Säugeth. vi. p. 317; Giebel, Säugeth. p. 202), described from a specimen in the Munich Museum, appears to be only a specimen of *R. unicornis*, with a second horn added by the preserver.

### 3. *Rhinoceros nasalis*.

B.M.

Skull elongate, the forehead and nose flat above, nose rounded on the sides in front; the nasal bones narrow, tapering, short, about two-fifths of the entire length of the skull from the nasal to the occipital crest; the zygomatic arch flat; lachrymal bone narrow, oblong, erect; the upper jaw only slightly contracted in front of the grinders ( $3\frac{1}{4}$  inches wide).

*Rhinoceros nasalis*, Gray, P. Z. S. 1867, p. 1012, figs. 1, 2 (skull).

*Hab.* Borneo?

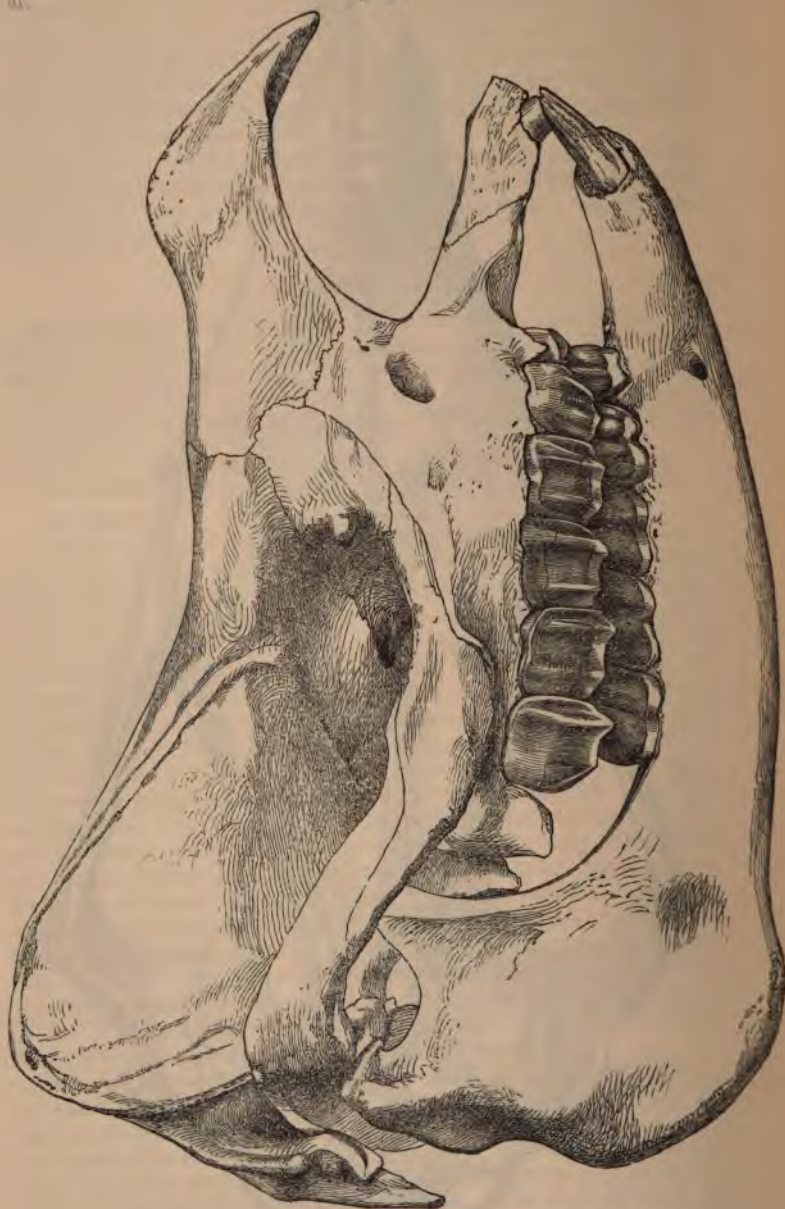
There are two not quite adult skulls in the British Museum (nos. 723 *b* and 723 *c*) which appear to belong to this species. They slightly differ from each other; but this may be sexual. They agree with *R. unicornis* in the flatness of the crown, forehead, and nose, and in the nose being rounded on the sides, and also in the slight contraction of the upper jaw in front of the grinders, and in the comparative flatness of the zygomatic arch. They chiefly differ from the skull of that species of the same age,—1, in the greater length of the skull; 2, in the breadth and flatness of the forehead; 3, in the line of the forehead not being so concave; 4, in the comparative slenderness and shortness of the nasal bones, they are only two-fifths of the entire length of the skull from the end of the nasal to the occipital crest, while in the skull of *R. unicornis*, nearly of the same age, in the College of Surgeons (no. 2975) the nasal bones are at least four-ninths of the entire length. The nasal bones are narrower and more tapering, their length being about once and one-half the breadth of the base. The upper jaw behind the internasal is only slightly contracted. They are at once known from *R. javanicus* by the greater length and narrowness of the skull, and the rounded form of the upper part of the nose, but they agree with the non-adult skull of that species in the shortness of the nasal bones.

The two specimens rather vary from each other in the width of the nasal. 723 *b* is a not quite adult animal; it is just showing the last or seventh grinder, but it wants the intermaxillaries. It was purchased of a dealer, and has been marked "*R. sondaicus*, Cuvier, Java," by some previous possessor. The habitat may depend on the person having decided it to be *R. sondaicus*. The skull differs from 723 *c* in the nasal being broader and more gradually tapering.



Fig. 34. Skull of *Rhinoceros nasalis*.

Fig. 35.

Skull of *Rhinoceros nasalis*.



723 *c* is nearly in the same state of dentition, as the seventh molar is just appearing. This was purchased of a dealer, who said that he received it direct from Borneo. The forehead, nose, and especially the nasal bones are narrower than in the preceding.

These skulls, from their size, indicate a species about the size of or rather smaller than *R. unicornis*.

**\*\* Upper jaw much contracted and very narrow in front of the grinders.**

#### 4. *Rhinoceros Floweri*.

Skull:—the forehead and nose flat above, the nose rounded on the sides in front; the nasal bones very slender, rather more than two-fifths of the entire length of the nose and crown; the zygomatic arch convex, arched outwards, having a very large roundish cavity for the temporal muscles; lachrymal bone elongate, expanded on the cheeks; the upper jaw suddenly contracted and very narrow (only  $2\frac{1}{2}$  inches wide) in front of the grinders; the diastema very long, longer than in the adult *R. unicornis*, being  $2\frac{3}{4}$  inches long.

*Rhinoceros sumatrensis*, Owen, *Cat. Osteol. Prep. Mus. Coll. Surg.* p. 506. no. 2934.

Tennu, *Raffles, Linn. Trans.* xiii. p. 269.

*Rhinoceros Floweri*, Gray, *P. Z. S.* 1867, p. 1015, figs. 3, 4.

*Hab.* Sumatra (*Raffles*). Skull, Mus. Coll. Surgeons, no. 2934.

A skull of this species is in the Museum of the Royal College of Surgeons, described by Professor Owen, as above cited, who calls it the cranium of a male Sumatran Rhinoceros (presented by Sir Stamford Raffles, *P. Z. S.*), observing that "the cranium offers no indication of the short hinder horn of this two-horned species." It is so distinct in form and size that I have no doubt of its belonging to a most distinct species. I propose to designate it after the energetic Curator of the Museum of the College of Surgeons, who in the few years that he has had charge of the collection has wonderfully improved it and increased its usefulness, not only to the zoological student, but for professional studies.

The skull is at once known from all the others I have examined by the convex prominent form of the zygomatics, and the contraction of the front of the upper jaw behind the cutting-teeth. It indicates a small species, not more than half the size of the common Indian Rhinoceros (*R. unicornis*).

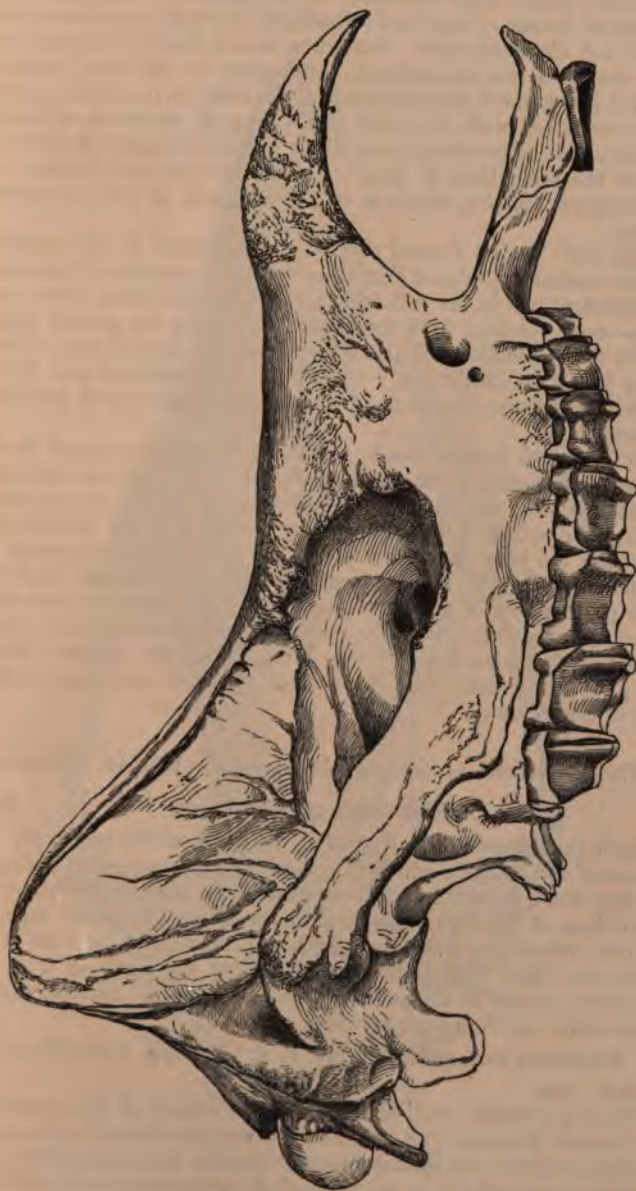
The skull no. 2934 is that of an adult animal with all its permanent teeth. It was named *R. sumatrensis* by Professor Owen: but it certainly is not a skull of that species; for the occipital end of the skull is projected and the condyle produced, and, though the skull is that of an adult animal, there is no mark of the root of the second horn, which is always well marked in the adult skull of that species. It is also distinguished from that species, as it is from *R. unicornis* and *R. javanicus*, by the convexity of the zygomatic arch and the size of the cavity for the temporal muscles.

It has been suggested that this skull may have belonged to an

Fig. 36.

Skull of *Rhinoceros Floweri*.

Fig. 37.



*Rhinoceros Floweri.*



Indian Rhinoceros that had been kept in a menagerie, and so very poorly fed that it never arrived at its full growth. The skull shows no sign of disease of any kind; the teeth are well worn down, as if it had had abundant food. Starvation is not likely to produce any such change in the proportions of the parts as this skull presents when it is compared with the skull of the adult *R. unicornis*, or even when compared with the skull of a young *R. unicornis* of nearly the same size. Starvation is not likely to have decreased the growth, and at the same time to have extended the size and thickness of the temporal muscles, which is so characteristic of this interesting species.

This skull having formed part of the collection of Sir Stamford Raffles renders it probable that the animal was a native of Sumatra. Sir Stamford had in his collection a few specimens from other localities—some obtained from Singapore, that being the general entrepôt for the productions of the Malay peninsula and islands. There being in this collection only the upper jaw preserved goes far to prove that it is not the skull of a menagerie specimen as has been suggested.

Sir Stamford Raffles observes, "There is another animal in the forests of Sumatra never yet noticed, which in size and character nearly resembles the Rhinoceros, and which is said to bear a single horn. The animal is distinguished by having a narrow whitish belt encircling the body, and is known to the natives of the interior by the name of Tenuu. It has been seen at several places; and, the description given of it by several persons unconnected with each other corresponding generally, no doubt can be entertained of the existence of such an animal" (see Linn. Trans. xiii. p. 269; Blyth, l. c. p. 164). I have little doubt that the skull here described is that of the Tenuu.

B. *The forehead and nose subcylindrical, rounded on the sides.* Rhinoceros.

#### 5. *Rhinoceros stenocephalus.*

B.M.

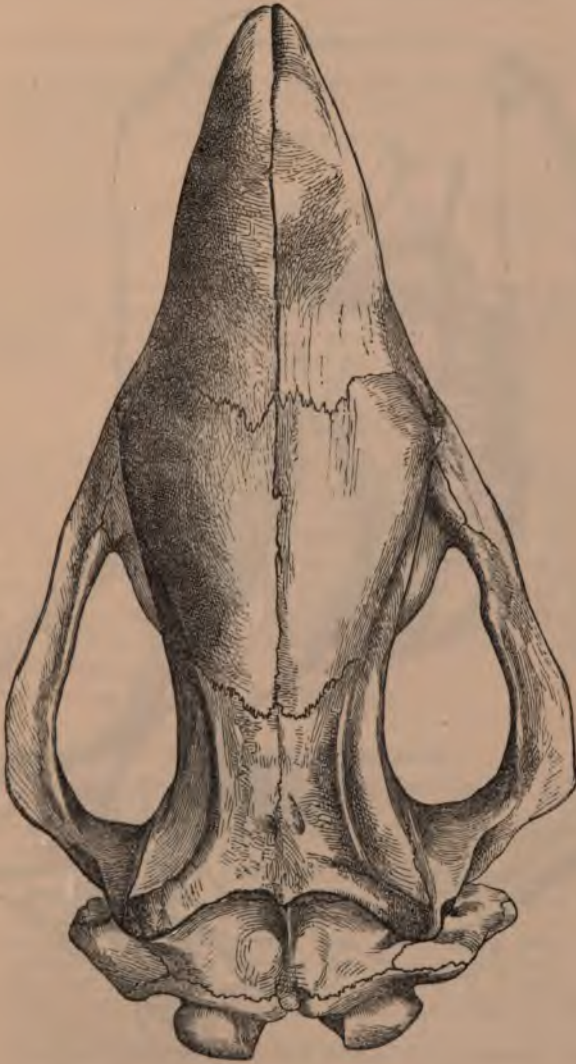
Skull (half-grown) like that of *R. unicornis* of the same age, but narrower and compressed; the forehead is narrow and subcylindrical; the nose much narrower and more slender; the nose is semicylindrical at the base of the horn; the nasal bones narrow, gradually tapering in front, more than twice the length of the width at the base of the nasal, more than four-fifths of the length of the forehead from the internasal suture to the occipital crest; lachrymal narrow, oblong, erect, about twice as high as wide.

*Rhinoceros stenocephalus*, Gray, P. Z. S. 1867, p. 1018, f. 5, 6.

*Hab.* Asia.

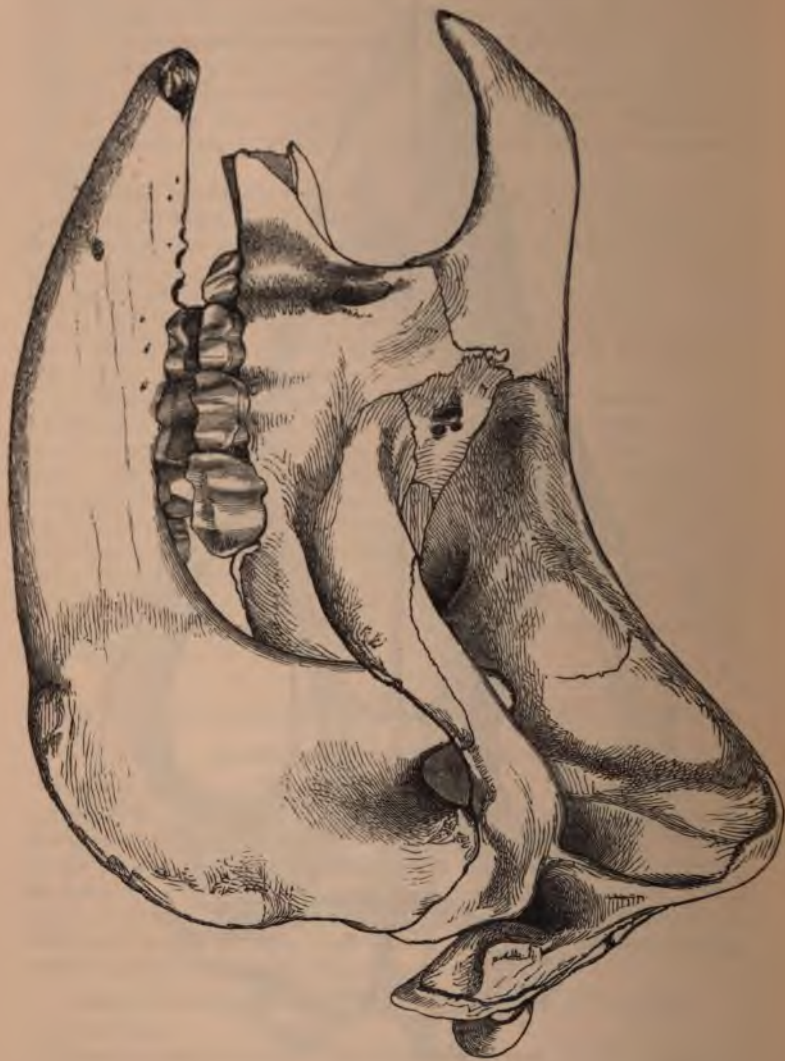
There is a single skull of a half-grown animal of this species in the British Museum (722 e), which was received from the Zoological Society, without any special habitat. In the roundness of the nose it shows some affinity to the skull of *R. sumatrensis*; it is different from that species in many particulars, in the prominence of the

Fig. 38.



*Rhinoceros stenocephalus.*

Fig. 39.

*Rhinoceros stenocephalus.*



occipital portion of the skull, and especially of the occipital condyles. When placed by the side of a *R. unicornis* of the same size and condition of teeth it stands rather higher, and is immediately known by the length and slenderness of the nose and nasal bones.

The following fossil species probably belong to this genus:—

1. RHINOCEROS LEPTORHINUS, Cuvier, *Oss. Foss.* ii. p. 71, t. 9, 10, 11; Blainv. *Ostéogr.* t. 1; Gray, *l. c.* p. 1021.

Rhinoceros Cuvieri, *Desm. Mamm.* p. 402.

*Hab.* Fossil.

2. RHINOCEROS INCISIVUS, Cuvier, *Oss. Foss.* ii. p. 89, t. 6. f. 9, 10; Blainv. *Ostéogr.* p. 1; Gray, *l. c.* p. 1021.

*Hab.* — ?

Cuvier (*Oss. Foss.* ii. p. 71, t. 9. f. 7) figures a fossil skull of a species of this genus from a drawing made at Milan by M. Adolphe Brongniart. See also an imperfect skull figured by Blainville (*Ostéographie*, t. 14, figure at left upper corner of the plate).

## 2. CERATORHINUS.

Skin divided into shields by deep folds, the lumbar fold rudimentary, short, only occupying the middle of the space between the groin and the back. Horns two: front longer, curved backwards; hinder small, conical. Skull:—forehead narrow, flat; the upper part of the nose on each side of the horns narrow, rounded, sub-cylindrical; the occipital region erect, the part near the condyles rather concave, the occipital condyle short, broad, oblong, placed obliquely inferior, scarcely prominent; lachrymal bone very large, irregular-shaped.

*Ceratorhinus*, Gray, *P. Z. S.* 1867, p. 1021.

### 1. *Ceratorhinus sumatranus*.

B.M.

Rhinocéros bicomme de Sumatra, Cuvier, *Oss. Foss.* ii. p. 27, t. 4, iii. p. 42, t. 78. f. 8 (from Bell, skull).

Rhinoceros sumatrensis, Cuvier; Blainv. *Ostéogr.* t. 2 (skull ♀), t. 7 (teeth).

Rhinocéros de Java, F. Cuvier, *Mamm. Lithog.* t. (not good).

Sumatran Rhinoceros, W. Bell, *Phil. Trans.* 1793, p. 3, t. 2, 3, 4; Home, *Phil. Trans.* 1821, p. 270, t. 21, 22.

Rhinoceros sumatranus, Raffles, *Linn. Trans.* xiii. p. 268; Blainv. *Ostéogr.* t. (skull); Gerrard, *Cat. Bones B. M.* p. 282; Müller, *Verhand.* t. 35 (old and young); Blyth, *P. Z. S.* 1861, p. 306, 1862, p. 1; *Journ. Asiat. Soc. Bengal*, xxxi. 1862, p. 151, t. 3. f. 1, 2, 3.

Rhinoceros Crossii, Gray, *P. Z. S.* 1854, p. 270 fig. (horns); Gerrard, *Cat. Bones B. M.* p. 282.

*Ceratorhinus sumatranus*, Gray, *P. Z. S.* 1867, p. 1021.

*Hab.* Sumatra (Bell); Tavoy, near Siamese frontier (Blyth); Pegu (Theobald, B. M.).

There are two skulls of this species in the British Museum:—  
 1. Adult, with a roughness on the forehead and nose made by the roots of the horns, from Pegu. 2. A skull of a two-thirds-grown animal, with the seventh grinder just appearing; it has the forehead and nose smooth. This was received from the Zoological Society, and is probably from Sir Stamford Raffles's collection from Sumatra.

The horn in the British Museum named *R. Crossii*, I have no doubt, from the figure that Mr. Blyth gives of the skull (Journ. Asiat. Soc. Bengal, 1862, t. 4), he is right in referring to this species.

When I described this horn I was told by several persons that it was only the horn of an African Rhinoceros that had been artificially prepared and bent back after being boiled; but the colour and structure of the horn showed that that could not be the case, and that it was the horn of a Rhinoceros which I had not before seen.

In the Museum of the Royal College of Surgeons there is a beautiful skeleton (no. 2938) of this species, received from Sir Stamford Raffles. There are also three skulls of adult or nearly adult age,—viz. nos. 2935, 2936, and 2938; the latter is cut open longitudinally to show the brain-cavity. From the roughness on the forehead in the adult skull, the hinder horn must be situated further back in this species than in the African *Rhinoceros*; the centre of the roughness is over the orbit. One of the skulls shows a rudimentary canine on one side of the upper jaw, placed in the front edge of the intermaxillary suture; this animal was just obtaining its first permanent molar.

The skull figured by Bell, and copied by Cuvier, represents the erect position of the occipital plane, as also does De Blainville's figure of the skull of a female. Mr. Blyth, who has seen these animals alive, thinks the horn that I provisionally described as *R. Crossii* is the horn of an adult male *C. sumatranus*. He says that the horns of the females are smaller than those of the males—observing, at the same time, that there is no difference in size in the horns of the two sexes of *R. unicornis* of India. In Bell's figure of the skull the intermaxillaries are represented as curved downwards. This may have been an individual peculiarity; they are more or less bent down obliquely in the skulls I have seen, but always in a straight direction.

The *Rhinoceros de Java* of M. F. Cuvier (Mamm. Lithogr.) is only a more accurate figure of the *R. sumatrensis*.

M. Cuvier, in the first edition of the the 'Règne Animal,' says the *Rhinoceros de Java* is smaller than the *R. sumatranus*; but in the second edition he refers to his brother's figures in the 'Mamm. Lithogr.,' and alters his description; so that both *R. sumatrensis* and *R. javanensis* are established on the Sumatran Rhinoceros.

This species is erroneously called by Jardine, in the 'Naturalist's Library,' "*R. sumatrensis*, the Lesser one-horned Rhinoceros."

The horns of the Rhinoceros are exceedingly difficult to procure; they are eagerly bought up at high prices by the Chinamen, who



not only value them as medicine, but carve them into very elegant ornaments (Blyth, *l. c.* p. 158).

## 2. *Ceratorhinus monspellianus*.

Rhinocéros de Montpellier, *Marcel de Serres*.

Rhinoceros monspellianus, *Blainv.*

Rhinoceros megarhinus, *De Cristol*; *Gervais, Zool. et Paléont. Franç.*  
ii. p. 43, iii. t. 2.

*Ceratorhinus monspellianus*, *Gray, P. Z. S.* 1867, p. 1023.

*Fossil*, Hérault, France.

This species chiefly differs from *R. sumatranus* in the nose behind the base of the front horn being prolonged and subcylindrical. This species has been mixed up with *R. tichorhinus* (see *Gervais, l. c.*).

II. The AFRICAN RHINOCEROTES. *The skin uniform, without any strong fold, except at the junction between the head and body. Nose with two horns, one behind the other, front longest. Skull—occiput and condyles not produced; nasal bones free, produced, broad, rounded in front; intermaxillaries rudimentary, very small; upper cutting-teeth none. Lower jaw arched below, thick. Teeth 28:—I.  $\frac{0}{0}$ .  $\frac{0}{0}$ . C.  $\frac{0}{0}$ .  $\frac{0}{0}$ . P.M.  $\frac{4}{4}$ .  $\frac{4}{4}$ . M.  $\frac{3}{3}$ .  $\frac{3}{3}$ .*

*Rhinaster, Gray, List Mamm. B. M.* 1840; *Gerrard, Cat. Bones B. M.* p. 281.

The African Rhinocerotes, *Gray, P. Z. S.* 1867, p. 1023.

I am not aware that any adult African Rhinoceros has been seen living in this country; and the external appearance of the species is chiefly known by the excellent figures given by Dr. Andrew Smith, in his 'Illustrations of the Zoology of South Africa,' who figures *Rhinoceros bicornis*, *R. sinus*, and *R. keitloa*. The specimens of these three species which he collected and had stuffed by M. Verreaux under his own superintendence, are in the British Museum.

There are two well marked forms of these animals, characterized by the shape of the head and skull. The first (or short, blunt-headed, narrow-nosed group) includes two, and the second (or long-headed, broad, square-nosed group) includes one well-marked species, and probably another distinguished by the form of the horns, of which only the horns are known.

There is a not quite adult skull of *R. bicornis*, and two adult skulls and two very young skulls of *R. sinus*, in the British Museum; and a skeleton of *R. keitloa*, previously only known from the description and figure of Camper. Cuvier figured two of these skulls, but considered them the adult and young of the same species. Unfortunately, *R. Oswellii* is only known from the horns; I am not aware that any skin or bones of the species have been brought to Europe. There is a large number of the horns of each of the species in the Museum collection; and they were known to Parsons, who figured them in the 'Philosophical Transactions' for



1742 and 1743; and the specimens which he figured are now in the British Museum.

There is considerable divergence of opinion among travellers respecting the horns of the African *Rhinoceros*. Dr. Andrew Smith observes, "I do not think that the horns of the same species of African Rhinoceroses are subject to any great variations in respect to relative length."

Capt. Cornwallis Harris, on the contrary, after describing the horns of *C. bicornis* as unequal, says "the horns are sometimes nearly of the same length." Further on he observes "that sometimes accident or disease renders the front horn the shortest of the two."

"The relative length of the horns varies a little in different individuals of *R. bicornis*; but the hindermost one in both sexes is invariably much the shortest, and in young specimens it is scarcely visible when the other is several inches in length."—*A. Smith*.

"In *R. keitloa* the young have horns of equal length."—*A. Smith*.

### 3. RHINASTER. (Black Rhinoceros.)

Head short, high; forehead convex; nose rounded in front. Upper lip with a central conical process. Horns two, unequal. Skin smooth, not divided into shields by plaits. Skull short, high; the portion of the skull behind the hinder edge of the last or seventh grinder not so long as the portion in front of it, the occiput erect, the upper margin only slightly produced over it; forehead concave, shelving; nasal bones on the sides convex, subspherical above, rounded in front. Tooth-line curved, bent up at each end. Lower jaw thick in front. Shoulder with a more or less developed hunch.

Rhinaster, *Gray*, *P. Z. S.* 1867, p. 1024.

"Living in herds; a 'browser,' feeding on leaves and young shoots of trees. It frequents forest and bush country, avoiding grassy plains."—*Kirk*, *P. Z. S.* 1864, p. 655.

a. *Horns cylindrical, conical, front recurved, hinder short; head short and high, compressed in front; forehead flat, narrow; upper lip sub-truncate; shoulder-hump rudimentary.* Rhinaster.—*Gray*, *P. Z. S.* 1867, p. 1024.

#### 1. Rhinaster bicornis. (Bovili.)

B.M.

Horns unequal, cylindrical at the base, and conical, blunt, the hinder smaller, front recurved; shoulder-hunch rudimentary, neck-grooves well marked. "Pale brown;" upper lip truncated, scarcely produced in the centre.

Rhinoceros horn, *Parsons*, *Phil. Trans.* 1742-43, t. 3. f. 3, 4.

Rhinoceros bicornis, *Linn. S. N.* i. p. 104; *Sparrm. K. Vet. Akad. Handl.* 1778, t. 9; *A. Smith, Ill. Z. S. Africa*, t. 2.

Rhinocéros bicorné du Cap (part.), *Giebel*, p. 200; *Cuvier, Oss. Foss.* ii. p. 29, t. 4. f. 7, t. 16. f. 10; *Blainv. Ostéogr. Onguligrades*, t. 3, 4 (skull &c.).

*Rhinoceros africanus*, *Desm. Mamm.* p. 400; *Harris, Portraits of Wild Animals of S. A.* p. 81, t. 11 (horns at p. 85); *Duvernoy, Arch. du Mus.* vii. t. 8.

*Rhinoceros Brucei*, *Blainv.*

*Rhinoceros niger*, *Schinz, Syn. Mamm.* p. 335.

*Rhinaster bicornis*, *Gray, P. Z. S.* 1867, p. 1024; *Gerrard, Cat. Bones B. M.* p. 282.

In the British Museum there is the skull of a nearly adult animal.

In the Museum of the Royal College of Surgeons is a very fine skull of an adult of this species (no. 2941), and the upper jaw covered with skin (no. 2942) and with the two horns attached to it. The horns are both circular at the base, regular conical, and blunt at the tip.

Schinz, who compiled a monograph of the genus, in his Synopsis named a species *R. niger*, after Capt. Alexander's description of the *Black Rhinoceros* in his 'Travels into the Interior of South Africa.'

- b. *Horns compressed, conical, elongate. Head short, swollen in front; forehead convex, shelving on the sides. Upper lip acute in the middle. Keitloa.*

## 2. *Rhinaster keitloa*. (The Keitloa or Ketloa.) B.M.

Upper lip with a central prominence, acute; horns elongate, hinder compressed, sharp-edged, often as long as the front one, front one rather compressed, recurved; shoulder without any hunch; skin pale yellow-brown. Skull short; face short from front edge of the orbit to the end of the nasal, not so long as from the front edge of orbit to occipital condyle.

*Rhinaster keitloa*, *Gray, P. Z. S.* 1867, p. 1025.

Var. 1. *keitloa*. The horns of nearly equal length; the hinder compressed, sharp-edged before and behind; the front one rather compressed, broad and flat in front.

*Rhinoceros horn*, *Parsons, Phil. Trans.* lvi. p. 32, t. 2. f. 8, 9. B.M.

*Rhinoceros ketloa* or *keitloa*, *A. Smith, Cat. S. A. Mus.* p. 7, 1837; *Illust. Zool. S. A.* t. 1; *Schinz, Syn. Mam.* p. 337.

*Rhinaster keitloa*, *Gray, List Mamm. B. M.*; *Gerrard, Cat. Bones B. M.*

Var. 2. *Camperi*. The horns both compressed and sharp-edged in front and behind, the front one twice as long as the hinder; upper lip with an acute central prominence.

*Rhinoceros bicornis capensis*, *P. Camper, Act. Petrop.* 1777, ii. p. 193, t. 3, 4, 5, 6 (copied *Blumenbach, Abbild.* t. 7. f. a).

*Rhinoceros bicornis* (adult), *Cuvier, Oss. Foss.* ii. t. 4. f. 5 (skull copied from *Camper*).

*Rhinoceros* —, *Sparrman, Voy.* ii. t. 3.

*Rhinoceros Camperi*, *Schinz, Syn. Mamm.* ii. p. 335; *Monogr.* t. 1.

Black *Rhinoceros*, *Baker, Albert Nyanza*, ii. p. 275; *Nile Tributaries*, fig. at p. 365 (head and horns).

*Hab.* South Africa (*Dr. A. Smith's type* in B. M.).



There is a skeleton of this species in the British Museum, purchased of Mr. Jesse, obtained during the Abyssinian expedition.

"The length of the head of *R. keitloa*, in proportion to the depth, is very different from that of *R. bicornis*. Upper lip distinctly produced; inside of the thigh black. The horns are of equal length and development in the young animal."—A. Smith.

This species is peculiar from the length of the hinder horn; but Schinz describes the front horn as very long, and the hinder short, conical.

Peter Camper (in 'Act. Petrop.' 1777, part 2, p. 193) described the head of a two-horned Rhinoceros which he received from the Cape of Good Hope. He figures the head and the skull in great detail. The upper lip has a distinct central process, or prehensile lobe; and the horns are both compressed and sharp-edged before and behind, the front one is the longest and regularly curved, the hinder well developed and elongate. The end of the nose of the head and skull is rounded and not square, and the nasal bones are not truncate, as in the skulls of *R. sinus* in the British Museum. I believe Camper's to be the first description of the *R. keitloa* of Dr. A. Smith.

Schinz gave the name of *R. Camperi* to a species which he says is *R. bicornis* of authors, and which is figured by A. Smith under that name in the 'Illustrations of the Zoology of South Africa;' but he describes the front horn as very long and recurved, and the hinder horn as small, triquetrous, compressed; while the hinder horn of *R. bicornis* is always conical, with a circular base. Schinz's *R. Camperi* appears to be a compilation from the figures of Sir A. Smith's *R. bicornis* and Camper's description and figure of the head of *R. keitloa*.

P. Camper, in giving the figures of this species, properly made the drawings like a diagram, without attending to the rules of perspective, so that the compass can be applied to any part. He gives a particular name to these figures, and calls them Catograph.

In Camper's figure the length from the back edge of the seventh molar to the front edge of the small intermaxillary is considerably greater than the distance behind the hinder edge of the last molar to the occipital condyle. In De Blainville's figure of *R. sinus*, and in the two specimens in the British Museum, the length from the hinder edge of the seventh molar to the front edge of the small intermaxillary is rather less, or about the length behind the hinder edge of the seventh molar to the outer part of the occipital condyle.

The *Keitloa* is recognized as a species distinct from *R. bicornis* by the tribes of natives; they have a different name for the two species.

If Cuvier had had a series of the skulls of *R. bicornis* he would never have thought that the skull figured by Camper was the adult of *R. bicornis*. The skulls of the different species alter very little in form during the growth of the animal when they have passed the very youngest, nearly fetal, state.



## 4. CERATOTHERIUM.

Head elongate, produced behind; forehead flat; nose very broad, square at the end; upper lip bovine, rounded. Horns two, very unequal, hinder small. Skin smooth, not divided into shields. Shoulder with a well-marked hunch. Skull elongate; the portion of the skull behind the hinder edge of the last or seventh grinder as long as the one in front of it; occiput erect, the upper margin much produced behind the condyle; forehead concave; nose straight, rounded; nasal bones very broad, convex above, truncated, with a sharp edge in front; lower jaw thick, tapering in front; molars large; teeth-line straight.

The skull of the very young animal has a very convex, nearly hemispherical prominence on the nasals, and is broad and rounded in front; but the prolongation of the hinder part of the skull is shown in the foetal skull in which the milk-grinders are only just appearing, the proportion of the hinder and anterior portions being nearly the same as in the adult skulls; the occiput is erect, without any marked projecting crest.

*Ceratotherium*, Gray, *P. Z. S.* 1867, p. 1027.

"Gentle and a 'grazer,' living in open plains, feeding on grass."  
—*A. Smith*. "The first animal that disappears before firearms."  
—*Kirk*, *P. Z. S.* 1864, p. 655.

1. *Ceratotherium simum*. (Mahoochoo.) B.M.

The front horn very long, slender, subcylindrical, recurved; hinder very small, conical; nose broad, high, square. "Pale grey-brown; shoulder, buttocks, and belly darker." The face of the skull from the front edge of the orbit longer than the portion of the skull behind this place.

Rhinoceros horn, *Parsons*, *Phil. Trans.* 1742-43, t. 3. f. 6 (front horn).  
Rhinoceros *simus*, *Burchell*; *Blainv. Journ. de Phys.* lxxi. p. 163, t. (head, horns bad); *Cuvier*, *Oss. Foss.* ii. p. 28; *Burchell*, *Travels*, ii. p. 75; *A. Smith*, *Zool. S. A.* t. 19 (animal); *Cat. S. A. Mus.* p. 9, 1837; *Blainv. Ostéogr. Onguligrades*, t. 4 (skull &c.); *Duvernoy*, *Arch. du Mus.* vii. t. 2, 3 (skull), t. 8 (skull, junior); *Sclater*, *P. Z. S.* 1864, p. 100.

Rhinoceros *Burchellii*, *Desm. Mamm.* p. 401.

Rhinoceros *simus* (Chicore), *A. Smith. Rep.* p. 68, 1836; *Harris*, *Sports in S. Africa*, p. 371.

Rhinoceros *camus*, *Ham. Smith*; *Griffith*, *A. K. v.* p. 746.

Rhinaster *simus*, *Gray*, *List Mam. B. M.* 1840; *Gerrard*, *Cat. Bones B. M.* p. 282.

? Rhinoceros *Gordonii*, *Blainv.*

*Ceratotherium simum*, *Gray*, *P. Z. S.* 1867, p. 1027.

The Square-nosed or White Rhinoceros (*Rhinoceros simus*), *Harris*, *Portraits of Wild Animals of S. A.* p. 97, t. 19 (horns at p. 101).

White Rhinoceros or Witte Rhinaster, *Colonists, Cape G. H.*

Chickore or Mohoochoo, *Bukeiana and Matabile*.

*Hab.* South Africa (*Burchell*; *Dr. A. Smith*, *type spec. B. M.*); Central Africa (*Kirk*).

There is a well-stuffed young specimen of this species in the British Museum, and two skulls of adult and two of very young animals.

In the Museum of the Royal College of Surgeons is a very fine adult skull of this species (no. 2960 *a*) with the two horns attached to the skin. It was obtained from Mr. Gordon Cumming's collection. It is 35 inches long from the end of the nasal to the occipital crest. The front horn is very long, slender, straight, and recurved; the front edge of the horn is worn by the animal rubbing it on the ground.

De Blainville obtained, when he was in London, from Mr. Burchell the drawing of the head of this species (engraved in the 'Journ. de Physique'); but the horns were added after it passed out of Burchell's hands, and are not the horns of the species.

In the British Museum there are two skulls of very young animals of this species that were received with the adult skulls in the collection; the milk-grinders are being formed, but could only just have been seen through the gums. The skulls are elongate, sub-cylindrical, and have a rounded nose, with a large nearly hemispherical prominence near the end of the upper surface for the support of the front horn. The grinders are very large compared with the size of the skulls, and occupy a great part of the cavity of the mouth; the hinder one is placed in the centre of the length of the underside of the skull from the nose to the condyle. The larger of these young skulls (1003 *b*) is very like the smaller one; but there is a fourth grinder being developed behind the third one; it is not elevated above the edge of the alveolus, and has no smooth enamelled edge. The small first grinder is only very little more developed than in the smaller skull. The line of grinders occupies  $6\frac{1}{2}$  inches. The intermaxillary bones are deficient. The palate ends, as in the smaller skull, in a line even with the back edge of the third grinder. The hinder part of the skull has lengthened more rapidly than the part in front of the edge of the palate. The nasals are slightly longer, compared with the length of the skull, than in the smaller specimen; they are  $4\frac{1}{8}$  inches long, the entire length being very nearly 14 inches—that is to say, nearly three-tenths of the entire length. The front of the nasal is more dilated on the sides, and becoming broader and more truncated as in the adult skulls.

The lower jaw of this specimen is considerably longer than the other; and there is little difference in the state of the teeth, except that the second and third grinders on each side are higher out of the gums, rather more worn on the edge, and the first and fourth grinders are rather more developed and larger, the first on the two sides not being quite equally developed, but one more exposed than the other.

The smaller specimen (1003 *c*) has three grinders appearing; the smallest front one is least developed, hardly raised above the alveolus, and not showing any smooth enamel; the second and third grinders



are nearly equally developed, the ridges being high and edged with enamel; the rest of the teeth are minutely rugulose; the hinder edge of the third grinder is on a line even with the front edge of the hinder nasal opening. The skull is 12 inches from the intermaxillary to the convexity of the condyle; the teeth-line is  $4\frac{1}{2}$  inches long. The facial portion (that is, the skull from the front of the intermaxillary to the front edge of the internal nostril) is only two-fifths of the entire length; it is the same length as from the front edge of the internal nostril to the suture between the basisphenoid and the basioccipital bone. Length from intermaxillary to front edge of internal nostril or end of palate 4 inches 7 lines, from end of palate to convexity of occipital condyle  $7\frac{1}{2}$  inches. The intermaxillary of one side is lost; the other has a narrow lower edge, not showing any appearance of cutting-teeth. The nearly hemispherical prominence on the nose is hollow, with thin even parietes; the cavity extends far back, and is open behind. The face, from end of nasal to the front edge of the orbit, is shorter than the part of the skull behind it, being from front end of nasal to front edge of orbit 5 inches 4 lines, from front edge of orbit to occipital crest 7 inches 2 lines. Nasal bones short and broad, being about two-sevenths of the entire length of the skull to the occipital crest.

The lower jaw shows four grinders and a cavity behind the fourth; the second and third grinders are most developed, raised above the alveolus, and furnished with a smooth enamel edge; the first small grinder is just showing, as is also the case with the fourth grinder, which is rather more developed than the front one; neither of these teeth is raised above the edge of the alveolus; the front edges marked with two or three series of small circular pits; but no cutting-teeth are visible.

In the Free Museum at Liverpool is the head of a large specimen, collected by Mr. Burke in Lord Derby's exploring party. The skin of the head is stuffed, and the skull kept separate.

An adult skull without the lower jaw is in the Museum of the London Missionary Society in Bloomfield Street, London, E.C., that was obtained by the Rev. John Campbell.

The Rev. John Campbell gives a figure of the head of this animal before the skin was removed, in his work entitled 'Travels in South Africa, Second Mission' (2 vols. 8vo, London, 1822), where it is called the "head of a Unicorn killed near the City of Mashow" (plate at p. 294 of the second volume). The artist has added a regular series of nearly equal-sized square teeth all along both jaws.

This figure is copied in Froriep's 'Notizen' for 1822, at vol. ii. p. 98; and a notice of the skull is given at p. 152 of vol. i. of the same journal.



2. *Ceratotherium Oswellii*. (Kobaaba.) B.M. (horn).

The front horn very long, thick at the base, bent back and then forward at the end, the front of the tip worn flat.

Très-grande corne de Rhinocéros, *Buffon*, *N. H.* x. t. 8. f. 5.

Rhinoceros horn, *Parsons*, *Phil. Trans.* 1742, 1743, t. 3. f. 6.

Rhinoceros *Oswellii*, *Gray*, *P. Z. S.* 1853, p. 46, f. (horn); *Ann. & Mag. N. H.* xv. p. 145.

Rhinoceros *Oswellii*, *Andersson*, *Lake Ngami*, p. 386, f. (head), p. 388, f. (horn).

*Ceratotherium Oswellii*, *Gray*, *P. Z. S.* 1867, p. 1029.

Kobaaba, *Baines*, *Land and Water*, July 28, 1866, f.

*Hab.* South Africa.

I have not seen any specimen, or even a skull, of this species, and I do not believe there is one in any European Museum.

Camper probably knew *R. Oswellii*. He observes, "Cornu anterius A D in hoc specimine incurvum adeo fuit ut alterum E F H, tamquam inutile reddiderit. Verum non ita in omnibus; possideo alterius cranii partem, cujus cornu anterius rectum, et antrorsum inclinatum est."—*Camper*, *l. c.* p. 186.

Mr. Baines gave a foetus of the Kobaaba to the Royal College of Surgeons (killed 3rd of June, 1862). He has shown me a series of drawings of the recently killed Kobaaba. One group represents the *R. sinus* and *R. Oswellii* side by side. The horns of the two are very different in appearance.

Mr. Baines says Mr. Chapman was informed by the natives that they had never seen a young Kobaaba = *C. Oswellii*. Mr. Baines says that it is possible that the horn, being worn away at the end by the constant friction on the front as it passes through the bushes, may bend forward in the older specimens. The Kaffirs make the horns of the cattle bend by scraping them on the sides towards which they wish them to turn.

Schinz gives the name of *niger* to the Rhinoceros horn figured by Andersson; but he describes it as curved back, in the same words as he described the horns of the other African species.

Camper compares the labial process to a finger, and says it is not unlike the lobe at the end of the trunk of the Elephant.

See M. F. Fresnel's "Sur l'existence d'une espèce unicorne de Rhinocéros dans la partie tropicale de l'Afrique" (*Comptes Rendus*, xxvi. 1848, p. 281). See also A. Smith's 'Illustr. Zool. S. A.' t. 1, where he says the natives mention a one-horned African species.

III. *Skin smooth, even. Skull elongate. Intermaxillary bony, short; the nasal, internasal, and the intermaxillaries united into one mass. Asia and Europe, fossil.*

## 5. CÆLODONTA.

Nose with two horns. Skull elongate; face rather produced; nasal bones broad, rounded in front; cutting-teeth none; intermaxillaries

very short; internasal bony, uniting the nasals, the intermaxillary, and maxillæ into one mass. *Hab.* Asia, Europe, Africa.

Rhinocéros à narines cloisonnées, *Cuvier, Oss. Foss.* ii. p. 64.  
*Cœlodonta*, *Brown*, 1831; *Gray, P. Z. S.* 1867, p. 1030.

#### *Cœlodonta Pallasii.*

B.M.

*Rhinoceros*, *Pallas, Acta Acad. Petrop.* 1777, ii. p. 210, t. 9; *Nov. Com. Petrop.* xiii. p. 447, t. 9, 10.

*Rhinoceros tichorinus*, *Cuvier, Oss. Foss.* ii. p. 64, t. 7. f. 1 (skull), t. 8, 9, 11, 14 (bones); *Blainv. Ostéogr.* t. 13 (from *Pallas*).

*Rhinoceros Pallasii*, *Desm. Mam.* p. 402.

*Rhinoceros antiquitatis*, *Blainv.*

*Rhinocéros de Sibérie*, *Cuv. Ann. Mus.* xii. p. 19, t. 1, 3, 4.

*Cœlodonta Pallasii*, *Gray, P. Z. S.* 1867, p. 1031.

*Hab.* Siberia, in the ice; fossil, Himalaya &c.

The following measurements are given in inches and lines, taken by a pair of callipers; so they are a straight line (or chord) from point to point indicated, and not a line over or along the surface. I believe they are sufficient for all zoological purposes; but it is the fashion of some zoologists and comparative anatomists to give measurements with three, and sometimes even four places of decimals, this arising from their taking a metre, about 39 inches, for the *unit*, which requires one decimal place for any measured or part of a measured inch or space under 39 inches, two for any similar measurement under 4 inches, and three for any under 5 lines. Others, to avoid this evil, write of 20 or 130 *mm.* (millimetres); but this is as inconvenient, as the latter *unit* is as much too small as the other is too large.

On pointing out this evil to a naturalist, who has published long tables with such admeasurements, he replied, did it not look very scientific? I fear, unfortunately, there is a desire to mystify general readers, and a quackery in natural history as in other less ennobling studies.

I have never yet met with a naturalist, even German or French, that could show me the size of a bone marked in the French metrical system; few cannot do this with considerable accuracy when marked in inches or feet. The having a measurement of well-known different lengths, as yards, feet, inches, or lines, which bear a relation to some parts of our own bodies, is a great advantage not found in the metrical system.

	<i>R. javanicus.</i>			<i>R. unicornis.</i>			<i>R. Bloerf.</i>			<i>R. nasalis.</i>			<i>R. stenoc-</i> <i>phalus.</i>			<i>R. annalra-</i> <i>nus.</i>			<i>R. bicornis.</i>			<i>R. sinua.</i>			<i>R. kellos.</i>		
	723 a.	723 d.	723 e.	722 f.	722 d.	722 b.	2975.	2954.	723 b.	723 e.	722 e.	1461 a.	1461 b.	1395 a.	1003 e.	1003 d.	1003 a.	1003 b.	1003 e.	1003 d.	1003 a.	1003 b.	1003 e.	1003 d.	1003 a.	1003 b.	1003 e.
Length from end of nasal to centre of occipital condyles...	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.	in. 1.
Length from end of nasal to occipital crest .....	24	9 24	3 18	0 26	3 26	6 23	0 21	0 22	0 23	6 22	3 21	3 21	6 19	3 21	7	12	0	14	9	29	9	28	9	27	0	27	0
Length from end of nasal to front of orbit .....	21	0 20	3 15	9 23	0 24	6 23	9 18	6 19	3 20	9 19	3 18	9 21	0	18	6	19	6	11	0	14	0	31	3	28	3	28	6
Length from end of nasal to condylar cavity .....	11	0 10	3	7	6 11	6 11	9 11	9 3	9 9	10 0	9 0	9 0	10 9	9 6	8	9	5	3	6	6	14	6	14	0	10	3	10
Length from end of nasal to length of teeth-line of grinders.	20	3 20	3 15	6 22	3 22	3 22	3 18	0 19	0 19	9 19	0 17	6	17	9	16	9	17	6	9	6	11	9	22	6	22	3	22
Length of nasal, centre .....	9	9 10	3	7	0 11	0 10	6 11	0	7	9	6 10	3	9	6	7	6	8	3	7	6	9	0	4	6	7	0	14
Length of lower jaw to upper parts of angle .....	...	...	...	6	9	...	...	...	8	3	...	...	8	0	7	6	8	6	...	7	3	6	0	3	0	4	3
Height of skull and lower jaw from angle to occipital crest.	17	9 18	6 14	9 20	3 20	6 20	3 17	3	...	17	9 17	0 17	3	...	15	3	17	6	9	11	9	21	0	22	0	22	0
Height of ramus of lower jaw to condyle .....	17	9 16	6 12	3 20	6 21	0 20	6 16	0	...	16	0 14	6 16	0	...	13	3	15	9	8	0	9	0	24	6	21	3	21
Width of occipital end .....	8	9	9	0	6	6 11	0 11	0 11	3	8	9	...	9	0	7	3	9	0	...	6	9	7	6	3	3	6	11
Width of hind part of zygomatic arch .....	11	6 11	9	8	9 11	6 12	0 11	0	8	9 10	6 10	6	9	0	8	9	7	9	7	3	9	0	5	0	5	9	10
Width of wide part of forehead over orbits .....	14	0 13	9 10	6 16	0 15	9 14	6 12	3 13	6 13	6	9 6 11	9	11	3	10	6	12	3	6	9	...	13	0	13	6	14	3
Width of nose at base of nasal opening .....	8	9	7	9	6	0	8	9	9	3	8	3	7	0	7	3	7	0	6	3	6	3	6	3	4	0	...
	4	6	4	9	3	6	5	6	5	0	4	6	3	6	4	6	4	3	4	0	4	6	4	0	5	0	3
	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.	jun.
	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.	fatal.

The measurements are from the nasal bones; the intermaxillaries are sometimes wanting. The measurements have been made by Mr. Edward Gerrard.



## Suborder V. SETIFERA.

The nose truncated, with a bony button on the crest over the nostrils, used for grubbing up roots. The toes in triangular hoofs in pairs; front pair large, posterior pair not reaching the ground; the outer one sometimes wanting. Cutting-teeth in each jaw normal, subequal; canines of male recurved.

*Sus*, *Linn.*; *Cuvier*.

*Setifera*, *Illiger*, *Prodr.* 1811.

*Suidæ*, *Bonap. Prodr. Syst. Mastol.*

*Pachydermata fissipeda*, *Latr. Règ. Anim.* p. 596, 1830.

*Setigera*, *Fitz. Sitz. Akad. Wiss.* 1864.

*Pachyderma paridigitata*, *Cuvier, Oss. Foss.*; *Burmeister*, 1840.

*Ungulata isodactyla seu artiodactyla*, *Owen, Odont.*

The distribution of Swine into species and the species into genera and families is attended with considerable difficulty; this probably arises from three peculiarities of the group:—

1. That most of the wild or presumed wild species are easily reduced to a domestic or semidomestic condition.
2. That the domestic breeds return to their wild condition, even in countries situated far away from their native habitats, and that, under favourable circumstances, the newly enfranchised animals are able to hold their own against the native and colonial cultivators.
3. That the domestic, and possibly the wild species have a great facility in breeding together, having fertile offspring.

There are very few countries that have, or are presumed to have, a native race of Pigs, where some of the kinds are not kept in a more or less domestic state. This is even the case where the animal is regarded with disgust and never eaten as food, except by the lowest class of the inhabitants, as in India.

"Wild Hogs abound in the Dukhun, and the male attains to a very great size. I am not satisfied that there is any specific difference between the European and Asiatic Wild Hogs. Every village abounds in hogs. The Village Hog is of the same colour as the wild animal, mostly a rusty black, and the only variations are slate-black or slate-brown; but it is not above two-thirds of the size of the latter. Tail never curled or spirally twisted. They dispute with the *Pariah dogs* the possession of the offal matter thrown out of the houses, and are the public scavengers."—*Sykes, P. Z. S.* 1831, p. 11.

"The Indian Wild Hog differs considerably from the German; the head of the former is longer and more pointed, and the plane of the forehead straight, while it is concave in the European; the ears of the former are small and pointed, of the latter larger and not so erect. The Indian is altogether a more active-looking animal. The German has a stronger and heavier appearance. The same differences are perceptible in the domesticated individuals of the two countries."—*Sykes, l. c.* p. 30.

In some of the islands of the Pacific the woods are stocked with

wild swine that are the produce of the litter of one breeding sow that has been introduced.

As an instance of the facility and rapidity with which the Pig may be completely naturalized and become a pest, one may mention New Zealand, where some of the pigs introduced by the colonists have escaped and their offspring have spread themselves over the country, and are now a pest to the colonial farmer and breeder of sheep, destroying the crops of the former, and following the ewes and eating the lambs as they are dropped on the sheep-walk. A reward of so much per head is paid for all the pigs that are destroyed in several parts of that colony.

I have attempted to arrange the genera of Suidæ in natural groups. All the genera are well defined, and, I believe, distinct. The only doubtful one is my genus *Centuriosus*, which was established on an animal which is as yet only known in a domesticated state, and one that breeds with facility with the Domestic Pig of Europe, and the mules are fertile.

The species of Pigs have been very much misunderstood. Pigs belonging to very distinct genera have been considered varieties of the same species, or only domestic varieties of the Common Hog. The genera and species have been gradually unravelled.

As an example, I may here observe that Desmarest regards *Sus porcus* (*Potamochoerus porcus*) as only a domestic variety of *Sus scrofa*.

Fischer considers *Sus koiropotamus* (*Potamochoerus larvatus*) a synonym of *Sus larvatus*, the type of the genus *Phacochoerus*.

Fitzinger, in his Essay on the Setifera, in the 'Sitzungsberichte' of the Vienna Academy for 1864, has brought together what has been written on the subject, and has given a useful synopsis of the species as characterized by their external characters.

Unfortunately we have not any good works on the Domestic Pig, or clear history of the origin of several of the most approved breeds, some of which are most probably the result of the interbreeding of several varieties.

Desmarest, in his 'Mammifères,' gives a list of the domestic varieties divided into subvarieties (see Mamm. p. 390).

Youall ('Pig,' 1860) and Richardson ('On the Pigs and their Origin,' 1847) have written on the English breeds.

Little information respecting the species of the family is to be obtained from travellers; they are generally satisfied with stating that a wild boar was observed, sometimes adding that it afforded good sport, and rarely make any observations respecting the Domestic Pigs. They often include under the name of "wild boar" species of different genera, as the French naturalists do under the name of *sanglier*. The skins of Pigs are rarely preserved, except by professional collectors; and they only collect the wild specimens; so that the specimens in Museums are limited in number and kinds, and afford very imperfect materials for the systematic zoologist.

The domestic animals of the different countries inhabited by man, and especially the effect of the climate or local circumstances on those that have been introduced from other countries, have yet to be



studied. There is no subject which naturalists living in a different country have so entirely neglected, because they have supposed that everything respecting it is known, while the truth is no animals are so imperfectly known or understood. Take, for instance, the Horse, which is so completely naturalized in North and South America, and so locally distributed in Africa—abundant, prosperous, and high-bred in some parts, very rare and, when present, greatly deteriorated in others, even in the same latitudes. It is the same with the Pig. Indeed these large animals, common to a great part of the inhabited world, are less known than the species of the Rats, Mice, Squirrels, Bats, and such small and comparatively unimportant animals, as far as man is concerned, who generally classes them with vermin.

\* *The premolars permanent, forming with the molars a continuous series of teeth.*

### Fam. 5. SUIDÆ.

Head pointed. Snout blunt, slender. Ears large. Body compressed. Legs slender. Skin covered with close bristly hairs. Grinders tubercular, with a few separate roots. Canines prismatic, triangular; upper recurved from the base. Teeth 44 or 40:—Cutting-teeth  $\frac{3}{3} \cdot \frac{3}{3}$ ; premolars  $\frac{4}{4} \cdot \frac{4}{4}$  or  $\frac{3}{3} \cdot \frac{3}{3}$ ; molars  $\frac{3}{3} \cdot \frac{3}{3}$ . Tail elongate, rarely absent. Teats 10 or rarely 8. Young of wild races striped on the sides.

Suina, Gray, *Ann. Phil.* 1825; *List Mamm. B. M.* p. 284; Bonap.

*Prod.* p. 5; Giebel, *Säugeth.* p. 221.

Setigera, Fitz, *Sitz. Akad. der Wiss.* 1864, p. 383.

Suidæ, Owen, *Odont.* i. p. 543; Gray, *P. Z. S.* 1868, p. 22.

Suidæ, Lesson, *N. Tab. R. A.* 1842, p. 160.

Suidæ, § 3, Schinz, *Syst. Verz.* ii. p. 344.

The change in the dentition of the Pig is represented by De Blainville, 'Ostéographie, Onguligrades,' *Sus*, t. 8, and by Owen, 'Odont,' p. 524, t. 140. Buffon (*Hist. Nat.* v. p. 110) erroneously says that the milk-teeth of the Pig are not changed, and remain permanent. At page 181 he quotes (Aristotle, *Des Animaux*, lib. 2. chap. 1) further that the Pigs never lose any of their teeth. The crown of the grinders are many-lobed, especially the hinder one, which is larger than the rest.

"The progressive increase of size in the molar teeth as they are situated further back in the mouth may also be noticed as a family characteristic, which, with the complication of the crown and development of the teeth, reaches its maximum in the Phacochæres."—Owen, *Odont.* p. 544.



*Synopsis of the Genera.*

A. TYPICAL SWINE (SUINA). *Cutting-teeth*  $\frac{4}{5}$ ; *intermaxillary short*; *diastema between the cutting-teeth and grinders short*; *canines thick*; *spread out*; *the sheaths of the upper canines spreading out and the bent up at the end*; *premolars*  $\frac{3}{4}$ ,  $\frac{3}{4}$ ; *molars*  $\frac{3}{4}$ ,  $\frac{3}{4}$ .

a. Wild Swine. *Face elongate*. *The ears erect, moderate, hairy*. *Colour uniform or grizzled*; *young yellow, streaked*. *Skull elongated*; *facial line straight*; *forehead convex*.

1. SUS. *Ears ovate, hairy*. *Tail moderate, tufted at the end*. *Skull—nose convex, rounded and smooth on the sides above*; *concavity on the cheeks reaching to the edge of the orbit*. *Male with a ridge across the upper part of the base of the sheath of the canines*.

2. PORCULA. *Ears ovate, hairy*. *Tail rudimentary*. *Skull—nose tapering, rather thickened on the edge in front of the orbit*. *Canines small, spreading*; *upper not recurved, without a ridge on the sheath*.

3. POTAMOCHÆRUS. *Ears elongate, tapering, acute, and pencilled at the tips*. *Tail thick, high up on the haunches*. *Skull—nose flattened above and rather thickened on the upper edge*; *concavity of the cheeks separated from the orbit by a broad ridge*. *Males with the upper edge of the nose warty in front and with a large process from the upper part of the sheath of the canine tooth*. *Females with only a ridge across the base of the sheath of the canines*.

b. Domesticated Swine. *The ears more or less dependent, often very large*. *Colour black, white, or variegated*; *young like parents*. *Skull short*; *facial line sunken*; *forehead and top of nose flat*; *nose margined on the sides*.

4. SCROFA. *Face smooth or nearly so*. *Sheath of upper canine with a longitudinal ridge at the base*.

5. CENTURIOSUS. *Face strongly concentrically wrinkled*. *Sheath of upper canine with a large rounded tubercle at the base*.

B. ABNORMAL SWINE (BABIRUSSINA). *Cutting-teeth*  $\frac{4}{5}$ ; *intermaxilla and maxilla in front, forming a large diastema between the cutting-teeth and grinders*; *canines erect, parallel*; *the sheaths of the upper canines bent up from the base, and closely applied to the side of the jaw*; *premolars*  $\frac{3}{5}$ ,  $\frac{3}{5}$ , *the front ones early deciduous*.

6. BABIRUSSA.

A. TYPICAL SWINE (SUINA). *Cutting-teeth*  $\frac{4}{5}$  (*the outer upper rarely deciduous*); *intermaxilla short*; *diastema between the cutting-teeth and grinders short*; *canines thick, spreading out on sides of head*; *sheath of upper canine spreading out and bent up at the end*; *premolars*  $\frac{3}{4}$ .  
—Gray, P. Z. S. 1868, p. 22.

The depression in the skull behind the hinder nasal opening without any pits on the sides behind.

- a. Wild Swine. *The ears erect, hairy. Colour of fur uniform or more or less grizzled. Young yellow, streaked. Skull elongate; facial line straight; forehead convex.*—Gray, l. c. p. 22.

## 1. SUS.

Face conical, simple, or with two or three small warts on each cheek. Ears ovate, hairy. Tail moderate, tufted at the end. Skull elongate; the forehead and upper part of nose rounded on the sides; upper part of the intermaxillary bone smooth; nose very long, tapering, convex, rounded and smooth on the sides above; concavity on the cheek deep, continued nearly to the orbit behind. Canines well developed, of upper jaw recurved; the sheath of the upper canine (of the males at least) with a longitudinal ridge across the upper part of the base.

*Hab.* Europe, Asia, and the Malay Islands.

*Sus*, *Lin.*; Gray, *P. Z. S.* 1852, p. 130, 1868, p. 22; *Owen*, *Odont.* p. 534, t. 140. f. 1; *Fitz.* *Sitz. Akad. der Wiss.* 1864, p. 384; *F. Cuv. Dent. Mamm.* p. 208, t. 85.

The head and skull lengthened absolutely, and as compared with its width, as the animal increases in age, and especially as it reaches adult and old age. The nasal bones of the skull elongated as the animal increases in age. In the young they seldom extend beyond a line even with the larger foramen on the side of the face; but in the adult they are generally much produced behind it (*P. Z. S.* 1852, p. 131).

The descriptions and the figures of the two jaws in *F. Cuvier's* 'Dent. Mamm.' p. 208, do not agree; he says there are 14 grinders in each jaw, and divides them into 6 false molars and 8 molars in the upper, and 2 false and 6 molars in the lower; the 2 is perhaps a mistake for 8. The front lower premolar is far from the canine and second premolar; three upper and four lower premolars compressed; the last grinder elongate, longer than broad.

*Fitzinger*, in his monograph, divides the Pigs thus, according to the presence or absence of warts on the face:—

Warts none:—*Sus leucomystax*, *S. timorensis*, *S. vittatus*, *S. barbatus*, *S. cristatus*, *S. sennaariensis*.

Warts small, under eyes:—*S. scrofa*.

Warts three—one large, on the mandible, covered with long bristles, and a small one under the eye, and the other above the canines:—*S. verrucosus*, *S. celebensis*.

The Pigs may be divided geographically:—Europe, *S. scrofa*; Asia Minor, *S. libycus*; India, *S. cristatus*, *S. andamanensis*; Africa, *S. sennaariensis*; Malay Islands, *S. verrucosus*, *S. celebensis*, *S. barbatus*, *S. vittatus*, *S. timorensis*; Japan and Formosa, *S. leucomystax*.



† Head moderate, with three small warts, and one at the back angle of lower jaw. Skull with the lower jaw above half as long again as the height at the occiput; concavity in front of orbit deep, and narrow behind. Nape erect.—Gray, l. c. p. 23.

### 1. *Sus verrucosus*.

B.M.

Ears moderate, nakedish. Fur with scattered bristles; yellowish or blackish brown, beneath yellowish white; bristles above the mandibular wart white. Warts three:—one on the cheek, large, covered with long bristles; another below the eye, smaller; a third above the canine teeth, small.

*Sus verrucosus*, Boie, MS.; *S. Müller*, *Verhand.* i. 42. p. 175, t. 28 (adult), t. 32. f. 1-4 (skull); *Gerrard*, *Cat. Bones B. M.* p. 278; *Gray*, *P. Z. S.* 1868, p. 23.

*Sus scrofa*, var., *Giebel*, *Säugeth.* p. 225.

*Hab.* Java; Borneo; Ceram.

The skulls in the British Museum are:—

No. 712 c. An adult skull from Java. Length 16 inches, height at occiput  $8\frac{3}{4}$  inches (see Müller, *Verh.* t. 32. f. 3, 4). Nose rather broad behind, tapering from the orbits, more compressed in front; concavity on cheek very deep; forehead convex; zygomatic arch very large, swollen, convex externally. The side of the lower jaw much swollen and prominent. The nose of this skull is much wider than that of the skull from Ceram (712 d).

No. 1362 a. An adult skull, without cutting-teeth and canines, and rather broken on the nose, received from Mr. Wallace as the skull of *S. vittatus* from Borneo, is very similar to no. 712 c from Java,  $14\frac{1}{2}$  inches long,  $8\frac{3}{4}$  inches high at the occiput. The forehead not quite so convex; but in almost all other respects they agree, except that the sides of the lower jaw are not so much swollen and convex. These skulls are known from those of *S. vittatus* by the concavity in the front of the orbit being very deep, ovate, and narrow behind, instead of broad and square (that is, ending in a nearly straight line).

Three other adult skulls, apparently belonging to the same species, were received without any habitat (but probably from Java or some other Dutch colony) from the Utrecht Museum. One is 15 inches long,  $9\frac{1}{2}$  inches high at the occiput; the second 16 inches long,  $9\frac{3}{4}$  inches high at the occiput; the third, length 15, height at the occiput  $8\frac{1}{2}$  inches.

Var. *ceramica*. No. 712 d. Skull, adult. A Wild Boar from Ceram, collected by Mr. Wallace. Length 15 inches, height at occiput 8 inches. Nose tapering, very narrow, compressed and deeply concave on each side in front of the orbits; the zygomatic arch large, swollen, and convex externally; the crest on the sheath of the upper canine is narrow and short.

No. 712 f. An adult skull, obtained from the Utrecht Museum, named "*Sus larvatus*," without any habitat, which is very like 712 d from Ceram, but considerably larger, being  $16\frac{1}{2}$  inches long



and  $8\frac{3}{4}$  inches high; the nose is broader and rather wider in front over the canines; the crest on the hinder part of the sheath of the upper canine is similar, smaller, but thicker.

In both skulls the crest on the canine is much shorter and less marked, and the sides of the lower jaw are swollen, but not so swollen and convex as in 712 c from Java.

The specimen from Ceram (712 d) differs from all the others in the nose being much narrower, more compressed, and apparently longer compared with the length of the brain-case.

Otherwise the four skulls from the Utrecht Museum and the one from Java (712 c) are all very much alike.

Mr. Blyth considers his *Sus ceylonensis* (Journ. Asiat. Soc. Beng. xx. p. 173; *Sus zeylanensis*, Blyth, MS. fotogr.) a variety of *S. barbatus*, which he says has been introduced from Borneo to Ceylon. Judging from the photograph of the skull, which has *Sus zeylanensis* written on it, it is much shorter and thicker than the skull of *S. barbatus*. The photograph is much more like that of *Sus verrucosus*.

†† Head moderate, and without warts. Skull with the lower jaw about half as long again as high at the occiput; concavity on cheek in front of the orbit wide behind.—Gray, l. c. p. 25.

a. Skull—concavity on cheek in front of the orbit deep behind, and separated from the orbit by a well-marked ridge.

## 2. *Sus celebensis*.

B.M.

Black-brown above and below; bristles on upper mandibular wart white. Ears moderate, nakedish; fur with scattered bristles. "Head with three warts; the wart on the upper jaw large; the one under the eye and the other over the canine-teeth very small, indistinct."

*Sus celebensis*, S. Müller, *Verhandl.* i. pp. 172, 177, t. 28\* (animal and skull); Gerrard, *Cat. Bones B. M.* p. 278; Gray, *P. Z. S.* 1868, p. 25.

*Sus verrucosus* β, Wagner, *Schreb. Säugeth. Suppl.* iv. p. 299.

*Sus scrofa*, var., Giebel, *Säugeth.* p. 235.

*Hab.* Celebes (S. Müller).

B.M.

Skull rather more than half as long again as high; concavity on the cheek in front of the orbit very deep behind, separated from the orbit by a high narrow ridge; sheath of upper canine with large light crest-like ridges (see Müller, *Verh.* t. 28\*. f. 2, 3).

## 3. *Sus vitattus*.

B.M.

Yellowish or brown-black, with a white streak from the end of the nose to the angle of the mandible. Ears moderate, nakedish; fur with scattered bristles. Head without any warts. Skull short; concavity in front of orbit broad and deep, near the orbit, but separated from it by a broad ridge.

*Sus vittatus*, Boie, MS.; S. Müller, *Verhand.* i. 42. pp. 172, 173, t. 29 (animal), t. 32, f. 5 (skull); Blainv. *Ostéogr. Onguligr.* t. 5 (skull); P. Z. S. 1860, pp. 442, 443; Gerrard, *Cat. Bones B. M.* p. 277; Gray, P. Z. S. 1868, p. 25.

*Sus scrofa*, var., Giebel, *Säugeth.* p. 225.

*Hab.* Java; Borneo; Amboyna; Macassar; Banka.

A skeleton (712 c) of a Pig, received from the Zoological Society under the name of the Javan Pig (*Sus verrucosus*), seems to belong to this species; but the concavity in front of the eye is scarcely as deep as usual, perhaps arising from its having been long in confinement.

No 1362 c. Skull of an adult male of *Sus vittatus* from Amboyna, from Mr. Wallace. Nose rather wide before in front of the orbit, and then with parallel sides; concavity in front of orbit deep and large, separated from the front of the orbit by a narrow raised convex edge. Canines thick; crest at base strong. Length  $12\frac{1}{2}$ , height at occiput 8 inches. The processes of the sheaths of the upper canines are curved back, sharp-edged above, and straight and truncated at the end.

No. 1362 d. Skull of adult, very like 1362 c, also from Amboyna, from Mr. Wallace's collection. Length 12, height  $8\frac{1}{2}$  inches. The concavity in the front of the orbit is deeper and the ridge separating it from the cavity of the orbit more marked. The process of the sheath of the upper canine is similar, but rather larger, the upper edge is sharp-edged at the end, longer, more ovate, convex, and rugose.

No. 1362 h. Skull of an old male from Batchian, from Mr. Wallace's collection. Length 13, height at occiput  $8\frac{1}{4}$  inches. Very like 1362 d from Amboyna; but the forehead is narrower and flatter, and the nose broader, being rather wider in front over the canines than in front of orbits; the concavity in front of the orbit similar and deep, and with well-marked outer orbital ridges. The process of the sheath of the upper canine is shorter, thicker, blunter, with a rounded end, and without any distinctly sharp-crested front edge.

No 1362 b. Skull of an adult, with well-worn grinders, a "Wild Boar from Java," from Mr. Wallace's collection. Length  $13\frac{1}{2}$ , height  $8\frac{1}{2}$  inches. Very similar to *S. vittatus* from Amboyna (1362 c and 1362 d); but the nose of the skull is rather broader, especially in front, and the sheath of the upper canine is only furnished with a well-marked ridge behind. The concavity on the cheeks is very deep and wide in front, but not so well marked and deep on the hinder edge, where it is separated from the orbit by a wide flattish space.

No. 1362 f. Skull of an animal developing the hinder molar; the concavity in front of the orbit not so deep and well marked, as usual behind; zygomatic arch and lower jaw swollen on the sides; the ridge of the sheath of the canine slight and sharp-edged. From the Utrecht Museum; probably from Java or some of the Dutch colonies. Length 13, height 7 inches.

No. 1362 g. A skull of an adult, received from the Utrecht Mu-



seum without any habitat, but most probably from Java, is very like the preceding; it is  $12\frac{1}{4}$  inches long and  $7\frac{3}{4}$  inches high at the occiput.

#### 4. *Sus leucomystax*. (Japanese Pig.) B.M.

Blackish brown; fur dense, bristly; streak on lower jaw and underside of body white. Ears rather large, densely pilose. Head without any wart.

*Sus leucomystax*, Temm. *Fauna Japon. Mamm.* p. 6, t. 20; Fitzinger, *Setigera*, p. 387; Swinhoe, *P. Z. S.* 1865, p. 466; Gray, *P. Z. S.* 1868, p. 26.

*Sus scrofa*, var., Giebel, *Säugeth.* p. 226.

*Sus taivanus*, Swinhoe, *P. Z. S.* 1864, p. 382, 1866, p. 419.

*Porcula taivana*, Swinhoe, *P. Z. S.* 1862, p. 360, 1864, p. 381.

*Hab.* Japan; Formosa (Swinhoe); Nagasaki (Swinhoe).

Mr. Swinhoe gave an account of the habits of the Pig in Formosa (*P. Z. S.* 1862, p. 361). It is a *Sus*, and not a *Porcula*.

Mr. Swinhoe (*P. Z. S.* 1862, p. 361) thinks this is a Wild Pig, the original stock of the Chinese Domestic Pig.

Mr. Blyth says this is the animal from which the Chinese Domestic Pig is supposed to be derived. There are three animals in the Zoological Gardens (Feb. 1867) which appear to be a domestic race from Formosa, although not much altered save in colouring from the wild animals (Blyth, *Land and Water*, Feb. 16, 1867, p. 84).

"Mr. Fraser has just received from the Island of Formosa, per the 'Maitland,' one Boar and one Sow of a red variety, and one Sow in pig, black variety, of a new species of Pig (*Sus taëvanus*, Swinhoe, *Proc. Zool. Soc. Lond.*) supposed to be the wild origin of the well-known Chinese Pig (Dec. 1867)." — *P. Z. S.* 1868, p. 27.

#### 5. *Sus cristatus*. B.M.

Bristles of forehead, occiput, and back elongate, forming a mane; cheeks with a beard. Yellowish brown, black-varied; beneath dirty white. Nose and extremity brownish. Ears moderate, nakedish, covered with scattered bristles. Head without any warts. Hoofs white.

*Sus scrofa*, Elliot, *Madras Journ.* x. p. 216, 1839, 1; Adams, *P. Z. S.* 1860, p. 531.

*Sus scrofa*, var. *indicus*, Horsfield, *Cat. Mamm. M. E. I. C.* p. 193; Blainv. *Ostéogr.* t. 5.

*Sus indicus*, Gray, *List of Mamm. B. M.* p. 185, 1840; Horsfield, *P. Z. S.* 1852, p. 130, 1856, p. 406; Cantor, *Journ. Asiat. Soc.* xv. p. 261; Schinz, *Syn. Mamm.* ii. p. 350; Blainv. *Ostéogr. Onguligr.* t. 5 (skull); *P. Z. S.* 1848, p. 73, 1850, p. 158, 1852, p. 130, 1860, p. 181; Gerrard, *Cat. Bones, B. M.* p. 277.

*Sus bengalensis*, Blyth, *Journ. A. S. Bengal*, xxix. p. 304.

*Sus cristatus*, Wagner, *Munch. gel. Anzeig.* lx. p. 535, 1839; Fitz. *Sitz. Akad. d. Wiss.* xlix. pp. 389, 417, 1864; Gray, *P. Z. S.* 1868, p. 27.

*Sus aper*, Hodgson, *J. A. S. Beng.* x. p. 911.



*Sus affinis*, Gray, Cat. Osteol. B. M. p. 71, 1847.

*Sus scrofa*, var. *isonotus*, Hodgson, Icon. B. M. t. p. 216.

*Hab.* India; Malabar (*Blainv.*); Nepal, Tarai and mountains (*Hodgson*); Banks of Punjab (*Adams*); Penang, Singapore, and Landed Island (*Fitzinger*).

Mr. Bryan Hodgson describes two varieties (see Journ. A. S. Bengal, i. pp. 245 & 911) as inhabiting the Tarai and mountains of Nepal:—1. *aipomus*: tusk large; forequarters high. 2. *isonotus*: tusk small; back nearly horizontal. There is a figure of the latter variety in his drawings in the British Museum (t. 216): the nape and back are much crested.

716 u. Skull of adult male. Length 15, height  $9\frac{1}{2}$  inches. "Marquis." Nepal; B. H. Hodgson, Esq.

716 p. Skull of adult male. Length 14, height  $8\frac{3}{4}$  inches. Marked "Bilmareeah, *S. indicus*."

716 k. Skull of adult male. Length  $15\frac{1}{2}$ , height  $9\frac{1}{4}$  inches. Marked "*Sus babirusa*." Malabar (see *Blainv. Osteog. t. .*).

716 n. Skull of adult male. Length  $14\frac{1}{2}$ , height  $8\frac{3}{4}$  inches.

716 g. Skull of adult male. Length 14, height 9 inches. "Marquis." Nepal; B. H. Hodgson.

716 o. Skull of adult male. Length  $15\frac{1}{2}$ , height  $9\frac{1}{4}$  inches. India; Sir John Boileau.

716 f. Skull of adult male. Length 15, height  $8\frac{1}{2}$  inches. Nepal; B. H. Hodgson, Esq.

716 b. Skull of adult male. Length 13, height  $8\frac{3}{4}$  inches. India; General Hardwicke.

716 y. Skull of adult male. Length 14, height 9 inches. India; G. H. Money, Esq.

716 x. Skull of adult male, broken. India Museum, Zoological Society.

716 l. Skull of adult male. Length 13, height 9 inches. Nepal; Tarai; Professor Oldham.

716 e. Skull of adult male. Length  $13\frac{1}{2}$ , height 8 inches. "Wild Boar of the plains." Nepal; B. H. Hodgson, Esq. Forehead nearly flat.

716 d. Skull of adult male. Length 14, height  $8\frac{3}{4}$  inches. "Wild Boar of the plains." Nepal; B. H. Hodgson.

716 n. Skull of adult female. Length  $14\frac{3}{4}$ , height  $8\frac{1}{2}$  inches. India. Professor Oldham.

716 v. Skull of nearly adult female. Length  $12\frac{1}{2}$ , height  $7\frac{1}{2}$  inches. Neilgherries. *Sus affinis*, Gray, Cat. Osteol. p. 71, 1847.

716 c. Skull of young male? Length 13, height  $7\frac{1}{4}$  inches. Tarai, Nepal; B. H. Hodgson, Esq.

716 w. Skull of young male. Length 10, height  $6\frac{3}{4}$  inches. Tarai, Nepal; B. H. Hodgson, Esq. *Sus bengalensis*, Blyth (type).

716 m. Skull of young female. Length  $10\frac{1}{4}$ , height  $7\frac{1}{2}$  inches. Tarai, Nepal; Dr. Oldham.

716 q. Skull of young female. Length , height inches. Nepal; B. H. Hodgson. Nose much narrower and contracted behind in

front of the orbit, perhaps the character of the female sex. The skulls of female exotic Pigs are very rare in collections.

This series of skulls differ in the depth of the concavity on the hinder part of the cheeks in front of the orbit. It is very deep, and with a well-defined wide ridge behind in 716 o, 716 v, and 716 k. It is less marked in the others, in different degrees of distinctness and depth.

In the skulls of the younger animals the concavity is very shallow behind, and gradually shelving off to the orbit, as in 716 c, 716 w, 716 m, 716 q, 716 x. It is one of these skulls (716 w) that Mr. Blyth marked as like his type of *S. bengalensis*.

The skull of this species is like that of *Sus verrucosus* from the Malay Islands; but all the skulls differ from the skulls of *S. verrucosus* in the flatness of the zygomatic arch, compared with the thick swollen form of the zygoma in all the skulls of that species. The sides of the lower jaw are convex and swollen, but not so much so as the lower jaw of *S. verrucosus*.

- b. *Concavity on the cheeks of the skull in front of the orbit shallow behind, only separated from the orbit by a narrow ridge.*

#### 6. *Sus timorensis*.

B.M.

Yellowish or blackish brown, generally with a white streak from the nose to the angle of the jaw. Ears moderate, nakedish; fur with scattered bristles, maned. "Head without any warts." Skull (young)—the concavity in front of the orbit shallow behind, and only separated from the orbit by a slight ridge.

*Sus timorensis*, *S. Müller, Verhand. i. pp. 42, 173, 178, t. 31. f. 1-3;*

*Gerrard, Cat. Bones B. M. p. 278; Gray, P. Z. S. 1868, p. 28.*

*Sus vittatus*  $\beta$ , *Wagner, Schreb. Säugeth. Suppl. iv.*

*Sus scrofa*, var., *Giebel, Säugeth. p. 225.*

*Sus*, sp., from Dampier Straits, *Sclater, List of Vert. Animals Zool. Gard. ed. 3. p. 37. n. 235.*

*Hab.* Timor and Rottie.

Like *S. vittatus*, but smaller.

1501 a. A skull of a young animal, very like the one figured by Müller (*Verhand. t. 32. f. 2, 3*); it is marked "young female *Babirussa*," from Mr. Wallace's collection. It is certainly not a *Babirussa*, having six upper cutting-teeth and short intermaxillaries, but is more probably a young female of the preceding. It has the concavity in front of the orbit shallow, and only separated from the orbit by a narrow ridge.

1501 c. Skull with the last grinder being developed (on one side only), perhaps young male? Inscribed "a Wild Pig, Makassar." Length  $10\frac{1}{2}$ , height at occiput 6 inches. Nose broad behind, tapering in front from orbit; concavity in front of orbit large, not deep, and extending close up to the edge of the cavity; the hinder suture of the parietal bone is produced and angular behind.

1501 b. A rather larger skull, also developing the last molar, and



probably a young male. A Wild Pig, Ternate, from Mr. Wallace's collection. Length  $12\frac{1}{2}$ , height  $5\frac{1}{2}$  inches. It is very similar to the above in all particulars, particularly in the shallowness of the concavity in front of the orbits, and in the crest-like form of the ridge behind the base of the sheath of the upper canines; hinder suture of the parietal produced and rounded behind.

The shallowness of the concavity on the cheeks of these specimens may depend on the youth of the animal, as it is to be found in the skull of the young *Sus indicus*. It is not always a character of youth, as it is found shallow and shelving off behind in the skull of the very old *Sus andamanensis* and *S. scrofa*.

There is the skin and skeleton (1501 d) of a "Wild Pig from Dampier Straits, in the Eastern archipelago," that was brought to the Museum by Mr. Swinhoe. It does not appear to differ from *S. timorensis* of S. Müller; and the skull is very like the skull from Ternate (1501 b). A specimen was living in the Society's Gardens. Mr. Bartlett thinks that the latter is "a domestic Pig running wild, because he has seen two specimens of them, both of which had white markings about the legs in a very irregular manner and other characters of the domestic Pig."

#### 7. *Sus andamanensis*. (Andaman Pig.)

B.M.

The concavity of the cheeks in front of the orbit deeply concave, shallower behind, shelving off to the orbit, and only separated from the orbit by a narrow ridge; in the male the sheaths of the upper canines with a well-marked ridge; the concavity in front of the orbit very wide; in the female the concavity narrower, and sheaths of the canines not developed.

*Sus andamanensis*, Blyth, *photogr. MS.*; *Sciater, List of Vert. Anim. Zool. Gard.* ed. 3. p. 37; *Gray, P. Z. S.* 1868, p. 30.

#### *Hab.* Andaman Islands.

Living in the Gardens of the Society. Also a hybrid between the female Andaman Pig and the male Wild Pig from Dampier Straits.

A skull of an adult male in the British Museum, without lower jaw (no. 1497 a):—The four front upper cutting-teeth very large, entire, square; the hinder lateral one very small, early deciduous. Lower cutting-teeth six, subequal, close together; upper canines very large, recurved, with a deep central ridge on the upper edge; concavity in front of the orbits very wide and deep; sheath produced, with a well-marked longitudinal crest on the upper reflexed edges.

A complete skull of an adult female (no. 1497 b) very similar to preceding, but concavity in front of the orbit narrower behind:—Upper canine small, compressed, without any developed sheath; no ridge above its root. Lower canines very large, subtrigonal; the first, two-rooted premolar on the hinder part of its base separated a short distance from the second premolar. Upper cutting-teeth three, the first very large; the second on the right side, and both the hinder ones have fallen out, and the cavity left is filled up.



The skull of this species is more nearly allied to the *Babirussa* than any others of the Pigs (*Sus*), the part in front of the canines being rather more produced than in other species, but not nearly so much so as in *Babirussa*; and the two hinder upper cutting-teeth are very small and often deciduous. In the skull of the adult male, for example, they were very small, but the pits they filled are present; in the adult female, the pits they filled are entirely obliterated. By a curious coincidence, the second upper cutting-teeth on the right side of the jaws of the skulls of both the male and female animals are wanting, and the pits they filled are obliterated; but this may be only an accidental circumstance, as the tooth on the other side is well developed.

#### 8. *Sus scrofa*.

Ears large, densely hairy. Fur blackish brown, densely bristly. Wart under the eye small. Skull elongate, slender; the concavity on the cheek in front of the orbit wide, shallow behind, shelving towards the orbit, and only separated from it by a narrow ridge.

*Sus aper*, *Brisson*; *Gray*, *P. Z. S.* 1852, p. 130, 1856, p. 406.

*Sus scrofa*, *Linn.*; *Giebel*, *Säugeth.* p. 225; *P. Z. S.* 1856, p. 158, 1858, p. 531, 1860, pp. 183, 448; *Blainv. Ostéogr. Onguligr.* t. 1. f. 4-6; *Fitz. Setigera*, p. 348; *Gray*, *P. Z. S.* 1868, p. 30.

*Sus setosus aper*, *Bodd. Elench. Anim.* i. p. 157.

*Sus scrofa aper*, *Erxl. Syst. R. A.* i. p. 176.

*Sus fasciatus*, *Gray*, *List Mamm. B. M.* p. 184.

*Sus scrofa fasciatus*, *Schreb. S.* p. 322 (jun.).

*Sus scrofa ferus*, *Gmel. Syst. Nat.* p. 217; *Gray*, *P. Z. S.* 1862, p. 13, f. 1, 2, 3 (skull and palate); *Blainv. Ostéogr.* t. 4 (skull, ♂).

*Sanglier*, *Buffon*, *H. N. v.* p. 176, t. 24. f. 1 (skull).

*Hab.* Europe.

*Var.* Domesticated. Head short, slender. Ears erect, pointed. Limbs short, slender. Hair of body rather crisp, ferruginous or blackish brown. *Junior* fasciated.

*Cochon turc*, *F. Cuvier*, *Dict. Sci. Nat.* ix. p. 512.

*Cochon turc ou de Mongolitz*, *Desm. Mamm.* p. 391.

*Sus scrofa domestica turcica*, *Fischer*, *Syn.* p. 422.

? *Sus scrofa*, var. (Maltese Pig), *Slater*, *P. Z. S.* 1862, p. 139.

*Hab.* European Turkey; Hungary; Vienna; Borneo.

Skull of adult (713 c), with diseased teeth and alveoli. Length 14, height 9 inches. From the Zoological Gardens; probably from Germany. The concavity on the cheeks wide, shallow behind, and gradually shelving off to the orbit. The sheaths of the upper canines with a well-marked elevated ridge behind.

Skull of adult (713 m). Length 15, height 8 inches. From Germany.

Skull of adult (713 f). Length 15, height 7½ inches. From the Museum of the Zoological Society.

Skull of adult (713 j). Length 14, height 7¾ inches. Germany, from Dr. Günther.

Skull developing the last molar (713 *w*). Length 13, height 6½ inches. Germany, from Mr. Gerrard.

A skin and skeleton of a Wild Boar from Barbary (*Sus scrofa barbarus*, Schlater, P. Z. S. 1860, p. 443), received from the Zoological Gardens. Skull (712 *j*) does not differ from the skull of the Wild Boar from Germany.

713 *k* and 713 *i*. Two skulls of young animals from the Zoological Society.

713 *g*. Skull of a nearly adult animal; purchased of a dealer.

#### 9. *Sus libycus*.

Animal — ?

*Sus libycus*, Gray, P. Z. S. 1868, p. 31.

? *Sus scrofa*, Tristram, P. Z. S. 1866, p. 84.

*Hab.* Asia Minor (*Xantus*). Skull in the British Museum, presented by Sir Charles Fellows.

Skull of adult (713 *a*). Length 14½, height 8½ inches. The concavity on the cheeks in front of the orbits very broad and very shallow, with a broad concavity in the middle; the hinder part moderately deep, separated from the orbit by a rather narrow well-marked prominent ridge. Nose narrow, and compressed over the lateral foramen. The sheath of the canine with only a slight ridge behind it.

The skull is very distinct from all the skulls of the Wild Boars from Germany in the British Museum.

The Wild Boar of the Holy Land, described by Mr. Tristram, may be the same. He observes:—

“Abundant in the wooded hills and maritime plains alike. Swarms in all the thickets by the Jordan and Dead Sea, and in the forest-country east of Jordan. Extends even to the bare wilderness of Judæa, and almost into the desert, where there is no cover, and where its only food is the roots of the desert bulbs.”—*Tristram*, P. Z. S. 1866, p. 84.

#### 10. *Sus sennaarensis*.

Fur dense, bristly, dull olive-black yellow-varied. Ears moderate, densely pilose. Head without any warts.

*Sus sennaarensis*, Fitz. Sitz. Akad. d. Wiss. xix. p. 365, 1864; *Setigera*, p. 388; Gray, P. Z. S. 1868, p. 32.

*Sus larvatus*, Fitz. Sitz. Akad. d. Wiss. x. p. 362.

? *Sus scrofa* (Egypt), Blainv. Ostéogr. t. 5 (skull).

? Cochon des Nègres, Buffon, H. N. Quad. v. p. 123.

*Hab.* North Africa: Sennaar; Kordofan; Sudan. Called “Quadruck” by the Arabs.

Dr. Murie says he has often seen and eaten the true Wild Boar of the genus *Sus* in Africa, as well as the *Potamochoerus* on the west coast. I have never seen any, or the skull of one.

††† *Head very long, slender, without warts. The skull elongate, more than twice as long as high; concavity in front of the orbit deep. Cheeks bearded. Euhys.*

11. *Sus barbatus*.

B.M.

Back covered with ochraceous, sides and beneath with black bristles; nose, extremities, and tuft at end of tail blackish. Skull much compressed, very long, slender. Ears moderate, nakedish. Fur with scattered bristles. Head very long, slender; sides of the jaws covered with crisp hairs; crown and occiput covered with short hairs. Head without any warts.

*Sus barbatus*, *S. Müller, Van der Hoeven, Tijdschr.* 1839, v. p. 149; *Verhandl.* i. pp. 42, 173, 179, t. 30, 31; *Gerrard, Cat. Bones B. M.* p. 278; *Fitzinger, Setigera*, p. 392; *Gray, P. Z. S.* 1868, p. 32.

*Sus scrofa*, var., *Giebel, Säugeth.* p. 225.

*Hab.* Borneo. Called "Wite Warken."

712 a. Skull of adult, from Borneo, presented by J. Brooke, Esq. Length from end of nasal to occipital crest 19 inches,  $9\frac{1}{2}$  high at occiput. Exactly like the figure in Müller's 'Verhand.' t. 31. f. 45.

712. Skull of a young animal changing its teeth, from Borneo. Capt. Sir E. Belcher. Length  $11\frac{1}{2}$  inches, 5 inches high at occiput. Nose very slender, attenuated; nose from the orbit double the length of the distance from the front of the orbit to the occiput; the zygomatic arch flat, thin.

## 2. PORCULA.

Head conical, moderate. Ears small, erect, hairy. Cheeks without any tubercles. Tail very short, rudimentary. Cutting-teeth  $\frac{3}{4}$ , two upper front largest, the lateral lower small; intermaxillary moderate, not produced; canines small, scarcely elevated above the other teeth, the upper one rather spread out, but not reflexed; premolars  $\frac{1}{4}$ .  $\frac{1}{4}$ .

*Porcula*, *Hodgson; Gerrard, Cat. Bones B. M.* p. 278, 1852; *Fitz. Sitz. Akad. d. Wiss.* 1864, p. 404; *Gray, P. Z. S.* 1868, p. 33.

The skull chiefly differs from *Sus* in being shorter and much smaller. The number and form of the teeth and of the intermaxillaries are the same as in *Sus*.

\* *Back and nape maned.*

1. *Porcula papuensis*. (The Bene.)

B.M.

Ears moderate, erect, nakedish, internally white. Fur very bristly above, with scattered bristles beneath; bristles of nape and back longer, forming a black mane; brown and reddish above, black and white beneath.

*Young.* Dark brown, with five fulvous streaks.

*Ben, Forrest, Voy.* p. 97, t. 2, 3.

*Sus papuensis*, *Lesson & Garn. Bull. Sci. Nat.* vii. pp. 80, 96; *Du-*  
z 2



*perrey, Voy. Coquille, Zool. i. t. 8; Gray, List Mamm. B. M. p. 185; P. Z. S. 1858, p. 107.*

*Porcula papuensis, Fitz. Sitz. Akad. d. Wiss, 1864, p. 23; Gray, P. Z. S. 1868, p. 33.*

*Papuan Hog, Lowe, Breeds of Domestic Anim. ii. p. 1.*

*Sus scrofa, var., Giebel, Säugeth. p. 226.*

*Hab.* New Guinea. Called 'Ben' or 'Bene.'

Lesson and Garnot described the skull as having only five grinders on each side of each jaw; but this animal was probably not full-grown. Canines not longer than the other teeth. Tail very short.

\*\* *Back and nape without any mane.*

## 2. *Porcula salviania.*

B.M.

Fur very bristly above, nakedish beneath; black-brown, grey- or yellowish-washed. Ears naked. Back without any crest.

*Porcula salviania, Hodgson, Journ. Asiat. Soc. xvi. pp. 423, 593, t. 12, 13, xvii. p. 480, t. 27; Horsfield, P. Z. S. 1853, p. 191; Fitz. Sitz. Akad. d. Wissen. 1864, p. 25; Gray, P. Z. S. 1868, p. 33.*

*Porcula sylvania, Gerrard, Cat. Bones, p. 278; Gray, P. Z. S. 1856, p. 406, Mamm. pl. 37.*

*Sus scrofa, var., Giebel, Säugeth. p. 226.*

*Pygmy Hog of the Saul Forests, Hodgson.*

*Hab.* Nepal; Sikkim; Saul Forests in Tarai.

Skull (1077 a) from the Saul Forests. Presented to the Museum by B. H. Hodgson, Esq. It is that of an animal developing the last molar. In form the skull is very like that of *Sus*, but shorter; the forehead is convex; the nose tapers in front of the orbit, is rather swollen and wide over the deeply concave cheeks; the concavity is deepest in the middle of the cheeks, and it is only separated from the orbit by the narrow edge of the orbit. The canines are small, the upper ones not recurved.

## 3. *POTAMOCHÆRUS.*

Face elongate, with a bony protuberance on each side, halfway between the nose and eyes. Ears elongate, suddenly tapering, and ending in a pencil of hairs. Tail thick, elongate, high up on the rump. Skull elongate; brain-case swollen; nose nearly of the same width the whole length, rounded above, with a rather thickened upper margin, and a deep concavity on the cheeks extending nearly to the front of the orbit, and partly over and nearly covering the malar process that supports the zygomatic arch.

Male swollen and often warty on the sides in front; sheath of the canine with a large broad process on the upper part of its base.

Female, side of the nose simple, and the sheath of the canine with a well-marked ridge across the upper part of its base.

Teats four. Young four at a birth, with longitudinal stripes.

*Koiropotamus, Gray, List Mamm. B. M. p. 185.*

*Choiropotamus, Gray, Ann. & Mag. N. H. 1852.*

Potamochoerus, *Gray, Ann. & Mag. N. H.* xv. p. 66; *P. Z. S.* 1868, p. 34; *Sclater, P. Z. S.* 1860, p. 301; *Fitz. Sitz. Akad. d. Wiss.* 1864, p. 19.

Phascochoerus, sp., *Jardine.*

Phacochoerus, sp., *Lesson in Tabl. R. A.* 1841, p. 162.

### 1. Potamochoerus africanus. (Bosch Vark.) B.M.

Ears densely hairy; internally white, with black edge and tuft. Fur black. Head and back whitish or yellowish; forehead and back black-varied; large spot beneath the eyes black.

*Skull.*—Male, the lateral tubercular ridge prominent, and elevated above the upper surface of the nose; lateral process on the base of the sheath of the upper canine broad, compressed, reaching to the level of the upper surface of the nose. Female with transverse ridge at the base of the sheath of the upper canine.

African Wild Boar, *Daniel, African Scenery*, t. 22.

Sus africanus, *Schreb. Säugeth.* i. p. 327; *P. Z. S.* 1852, p. 131;

*Blainv. in Laur. et Bazin, Anat. Phys.* t. 11. f. 9 (teeth); *Blainv.*

*Ostéogr.* t. 8. f. 1; *Gray, Griffith's A. K.* t.; *Reichenb. Naturg. d.*

*Pachyd.* t. 33. f. 129.

Sus larvatus, *F. Cur. Mém. Mus.* vii. p. 447, t. 22; *A. Smith, S. A.*

*Quart. Journ.* p. 90; *Blainv. Ostéogr. Onguligr.* t. (skull).

Sus koiropotamus, *Desmoul. Dict. Class. H. N.* vii. t. 1; *P. Z. S.* 1852, p. 131.

Koiropotamus africanus, *Gray, List Mamm. B. M.* p. 185.

Choiropotamus larvatus, *Gray, Ann. & Mag. N. H.* 1852.

Phacochoerus koiropotamus, *Lesson, N. Tab. R. A.* p. 162, 1841.

Sus koiropotamus, *Desmoulins, Dict. Class. H. N.* t. 7, ♀.

Sus choiropotamus, *Reichenb. Naturg. d. Pachyd.* t. 33. f. 48.

Potamochoerus larvatus, *Gray, Ann. & Mag. N. H.* xv. p. 66; *Fitz. Sitz. Akad. d. Wissen.* 1864, p. 19.

Potamochoerus africanus, *Gray, P. Z. S.* 1852, p. 131, 1858, p. 58,

1860, p. 443, 1868, p. 34; *Gerrard, Cat. Bones B. M.* p. 279; *Kirk,*

*P. Z. S.* 1864, p. 656.

Phascochoerus larvatus, *Jardine, Nat. Libr.* p. 232, t. 28.

Sanglier à masque, *Sganzin, Mém. Strasb.* iii. p. 1, t. 1.

Female, skull with only a ridge across the base of the sheath of the upper canines.—*P. Z. S.* 1868, p. 35.

Sus capensis, *Gray, Gerrard, Cat. of Bones B. M.* p. 277 (skull).

*Hab.* South Africa, called "Bosch Vark;" Central Africa, Zambesi delta, called "Njulvi" (*Kirk*).

"Scarcely any two specimens of this species exhibit the same colour; some are brownish black variegated with white, and others are almost entirely of a light reddish-brown or rufous tint without the white variations; indeed such are the varieties that it is scarcely possible to say what are the most prevailing colours."—*A. Smith, S. A. Quart. Journ.* p. 90.

1. In the British Museum there is a skeleton (1364 b) of a specimen that lived several years in the Zoological Gardens. In the skull the malar process is very broad, reaching nearly to the level of



the top of the nose; it is thin on each edge, and thickened near the outer hinder edge by a strong angular keel.

2. A skull (1364 *a*) that was purchased of Mr. Argent in 1851 as coming from South Africa. It has the process of the sheath of the canines nearly as long as the preceding (1364 *b*); but it is not so broad from side to side, and the outer surface is evenly rounded, without any keel. This skull very nearly resembles the one figured by De Blainville as that of *Sus larvatus* (Ostéograph. t. 5), and the skull figured by M. F. Cuvier (Mém. Mus.).

3. A skull from the Museum of Dr. de Jeude, probably from the Cape of Good Hope (1364 *c*).

The front of the lower jaw behind the canine is more dilated and swollen in *P. larvatus* (1364 *b*) than in the lower jaws of the two other skulls; but they all differ from each other more or less in this respect.

4. A skull without its lower jaw (715 *a*) was brought home by Captain Alexander from his Expedition to Damara, and presented to the British Museum. It is recorded in Mr. Gerrard's catalogue of the bones in the British Museum as *Sus capensis* (p. 277). It is the skull of an adult animal, with the crown of the grinders much worn. It is probably the skull of a female, as it agrees with all the characters of *Potamochoerus*, but it has only a well-marked ridge across the upper part of the base of the sheath of the upper canine, and the upper margin of the nose is not dilated or swollen.

## 2. *Potamochoerus porcus*. (Red River-Hog.) B.M.

Ears densely hairy; edges of ears and pencil white. Fur red-brown, beneath greyish white. Head and ears black; whiskers on the cheek, streak over and below the eyes, and dorsal mane white.

*Skull*.—Male, the prominence of the canine flat-topped and not raised above the surface of the nose; the lateral process of the sheath of the upper canine narrow at the base, dilated above, short, not reaching to the level of the upper surface of the nose. Female with only a ridge across the base of the sheath of the upper canine.

*Porcus guineensis*, *Marcgr. Bras.* p. 230, fig. (good).

"Cochon de guinée, *Buffon, H. N.* v. p. 146."

Guinea Pig, *Brown, Jam.* p. 487.

*Sus porcus*, *Linn. S. N.* p. 1032.

Porc de guinée, *Desm. Mamm.* p. 391; *Enc. Méth.* t. 39. f. 1 (from *Marcgr.*).

*Sus scrofa*, var. *porcus*, *Fischer, Syn.* p. 423.

*Sus guineensis*, *Brisson, R. A.* p. 109.

*Sus africanus*, *Smith; Griffith, A. K.* (not *Desm.*).

*Sus penicillatus*, *Schinz, Monogr. d. Säugeth.* t. 10; *Rev. Zool.* 1848, p. 152; *Gray, P. Z. S.* 1852, p. 132.

*Choiropotamus pictus*, *Gray, Ann. & Mag. N. H.* x. pp. 280, 281.

Painted Pig of the Camaroons, *Illustr. London News*, fig., 1852.

*Sus pictus*, *Wagner, Schreb. Säugeth. Supp.* v. pp. 302, 800.

*Potamochoerus albifrons*, *Du Chaillu, Proc. Boston N. H. S.* vii. p. 301, 1861; *Travels*, p. 422, t. 62; *Gray, P. Z. S.* 1861, p. 277.



*Potamochoerus penicillatus*, Gray, *Ann. & Mag. N. H.* xv. p. 66; *P. Z. S.* 1852, p. 131, t. 34; Gerrard, *Cat. Bones B. M.* p. 279; *Fitz. Kais. Akad. d. Wissen.* xix. p. 365; *Slater, P. Z. S.* 1861, p. 62, t. 12 (adult and young).

*Potamochoerus porcus*, Gray, *P. Z. S.* 1868, p. 36.

*Hab.* West Coast of Africa; Camaroons River; Guinea; naturalized in Brazil (*Marcgrave*).

Skeleton (no. 1363 *a*) of a male specimen from the Camaroons, that lived for several years in the Society's Gardens. The skull of this animal is figured by Mr. Slater in the 'Proceedings of the Zoological Society,' 1860, p. 301. The process on the base of the sheath of the canine is much shorter than in the skulls of *P. africanus* (1364 *a, b*); it does not reach the upper surface of the nose, is sub-cylindrical at the base, without any keel on its outer side, and broad at the end. It diverges much more from the side of the nose than in the skull from South Africa.

Two skulls, collected by Dr. Baikie in the interior of Africa (1363 *c* and 1363 *d*). They are very like the skull of the male animal from the Camaroons (1363 *a*). The process of the sheath of the upper canine in 1363 *c* is rather shorter and broader at the top than in that skull; and in 1363 *a* it is unfortunately broken off.

With these skulls Dr. Baikie brought another without the lower jaw (715 *b*) which is very like the others, only the side of the nose over the canines is not dilated, and there is only a slight ridge across the base of the upper surface of the sheath of the upper canine, as in the female from the Gardens (1363 *b*). The skull has adult dentition, and it is nearly of the same size, but not so aged, as the skull sent by Captain Alexander; it differs from it in the nose being more compressed and narrowed in front of the orbit. The condyles of this skull are large, and separated by a broad space beneath, as in all the other skulls of the genus, except that received from the Zoological Society.

A skeleton of a female, from the Camaroons, that lived in the Society's Gardens (Gerrard, *Cat. Bones*, no. 1363 *b*). In the 'Catalogue of Bones of Mammalia in the British Museum' the sexes of 1363 *a* and *b* are accidentally reversed. The skull had the dentition of an adult animal; the canines are very imperfectly developed, cylindrical, and smooth, and the sides flattened and grooved longitudinally beneath. The side of the nose of the skull is not swollen or warty over the canines, and there is only a well-marked ridge at the base of the upper surface of the sheath of the upper canine.

This skull differs from the others of the genus I have compared it with in the small size of the occipital condyles, which are also closer together on their under edge. The hinder nasal opening is wide and rounded.

The three skulls also differ in the form of the upper jaws in front of the base of the canines. They are longer and narrower in the two skulls which have been named *P. larvatus* (1364 *a, b*) than they are in the skull from the Camaroons named *P. penicillatus* or *P. porcus* (1363 *a*). But the two skulls with the longer intermaxil-

laries differ from one another, the intermaxillaries of 1364 *b* being longer and narrower than in the skull 1364 *a*.

The ridges on the underside of the canine of *P. penicillatus* (1363 *b*) are fewer, coarser, and more irregular than they are on the canines of the two other skulls (1364 *a* and *b*). The back and front sides of the canines are rounded in 1363 *a*, while they are flat in 1364 *a* and *b*; but the two latter differ considerably in flatness.

This species has been bred in the Society's Gardens, and reared the progeny. It will not breed with the Domestic Pig, or at least has not done so.

Marcgrave describes it as having a cyst on the navel, and says that it had been introduced by the negroes, and naturalized in Brazil.

I suppose that the Pig has not been found profitable, or was not fitted for the American climate, as the breeding of it has been discontinued. I have inquired of persons who have lived in different parts of Brazil; they all state that they have never seen or heard of the Painted Pig in that country; nor do I find any account of it in the modern works on the natural history of the country. Mr. J. Miers, F.R.S., has observed that Marcgrave only knew of the northern provinces of Brazil, then in possession of the Dutch, and that perhaps it still breeds there. My son and daughter, who travelled in those districts, and first made entomologists acquainted with the smaller Lepidoptera of the country, of which they collected very many new species, state that they never saw any Red Pig there.

### 3. *Potamochoerus madagascariensis*.

Sanglier de Madagascar, *Daubenton*; *Buffon*, *H. N.* xiv. p. 396; *Flacourt's Hist. Madagasc.* p. 151.

*Potamochoerus* —, *Gray*, *P. Z. S.* 1868, p. 38.

*Hab.* Madagascar.

Mr. Selater informs me that a species of this genus from Madagascar is living in the Jardin des Plantes at Paris. I am not aware that any specimens from that country have reached England.

- b.* Domesticated Swine. *Face short. The ears more or less dependent, often very large. Animal black, white, or mottled. Young like parents (not yellow-streaked). Skull short; facial line sunken; forehead and upper surface of the nose flattened, more or less distinct; nose margined on the sides.*—*Gray*, *l. c.* p. 38.

I do not believe that the Domestic Pig is derived from the Wild Boar of Europe, any more than the Domestic Cat is derived from the Wild Cat of Scotland, or the Dog from the Wolf of Europe; nor do I know of any exotic species of Pig from which it is likely to have been derived.

There is no doubt that the Domestic Pig will breed with the Wild Boar, and that there are hybrid breeds which are more like the Wild Boar than the normal domestic animal. On the other hand, the

wild species are often more or less domesticated in the countries they naturally inhabit; but these animals differ little from their wild progenitors, and are very different from the true domestic animals.

#### 4. SCROFA.

Face conical, smooth, or nearly so. Skull—sheath of the canine with a more or less distinct longitudinal crest across the base.

Scrofa, *Gray, P. Z. S.* 1868, p. 38.

##### Scrofa domestica.

Scrofa domestica, *Gray, P. Z. S.* 1868, p. 38.

*Sus verres*, *Plinius, Hist. Nat.* viii. p. 151.

*Sus domesticus*, *Brisson, Règ. Anim.* p. 106.

*Sus scrofa domesticus*, *Erxleb. Syst.* p. 179; *Fischer, Syn. Mamm.* p. 422.

*Cochon*, *Buffon, H. N.* v. p. 99.

*Verrat*, *Buffon, H. N.* v. p. 99, t. 17. f. 2 (t. 24. f. 3, skull).

Hog, *Penn.*

*Hab.* Domesticated in most parts of the inhabited world.

Some varieties have small erect hairy ears and strong long legs like wild swine.

Var. 1. *Cochon de Siam*, *Buffon*, v. pp. 125, 137, t. 17. f. 1 (t. 24. f. 2, skull?).

*Sus scrofa sinensis*, *Schreb.* t. 324 (copied from *Buffon*; not *S. sinensis*, *Brisson*).

Black. The young black, without any streaks. Face tapering. Skull rather short; crown rather convex (*Buffon*).

*Hab.* Siam. I have not seen the variety.

*Daubenton* describes the skeleton (*H. N.* v. p. 181). This has most unaccountably been confused with the Chinese Pig by *Desmarest*, *Fischer*, and others, which has very short thin legs, with the belly almost to the ground. I have not seen this variety.

*A young boar from Algiers.* Rusty brown; hair black, with long rusty ends. Nose, orbits, edge of ears, and a longitudinal streak on the whiskers black. Chest nakedish. No warts on the cheeks. Ears moderate, densely hairy.

*Hab.* Algiers (*B.M.*; *Henry Christy, Esq.*).

Skull in the British Museum (no. 713 r). This animal lived some time in the Zoological Society's Gardens. The skull is short, with a flat forehead and nose like that of a Domestic Pig. It is, in many respects, very like the *Cochon de Siam* of *Buffon*.

Var. 2. *Porc noir à jambe courte*, *F. Cuv.*

*Sus scrofa domestica meridionalis*, *Fischer, Syn. Mamm.* p. 442.

*Hab.* Italy.

Black. Ears small, nearly erect. A fold over the eyebrow.



Var. 3. *sinensis*.

*Sus scrofa sinensis*, *Brisson, R. A.* p. 108; *Erxl.* p. 181.  
*Chinesisches Schwein*, *Linn. West Goth.* p. 62.

Small. Black, white, or variegated. Back rather naked. Body very large; legs very short and thin.

A short-headed, swollen-cheeked, full-bodied Pig, with short thin legs, like our prize Pigs, was well known to the ancient Greeks. There are several representations in marble of such Pigs in the British Museum, which were procured by Captain Spratt from the Temenos of Demeter Cnidus, and are inscribed "Pig sacred to Persephone." These models chiefly differ from the form of the English prize Pig in the back being furnished with a well-marked, high compressed crest of bristles from the crown of the head to the tail. Similar Pigs are represented on Greek silver coins.

Long-legged, flat-sided sows with their young are represented among the reeds on the Assyrian Marbles in the Museum collection.

The Pigs naturalized in Pará and Pernambuco are black, like the Berkshire or Chinese breeds, with very thin legs, short nose, and thick cheeks. They were introduced from Portugal. In Rio they send the Pigs out in the marshy places to destroy the snakes before the negroes are turned in to cultivate the land; they eat the snakes greedily, and are said never to be injured by the bite of a snake, however poisonous.

Var. 4. *Wattled*, with a cylindrical wattle on the hinder corner of the lower jaw on one or both sides.

Irish Greyhound Pig, *Richardson on Pigs*, p. 30.

Var. 5. *Solid-hoofed Pigs*, with two front toes united into one hoof.

*Sus scrofa mononychus*, *Linn. Anim.* v. p. 461.

*Sus unguis solidis*, *Plinii H. N.* x. p. 146.

*Sus scrofa mononyx*, *Fischer, Syn.* p. 423.

Solid-hoofed Sow, *Struthers, Edinb. N. P. Journ.* 1863; *Blauv. Ostéogr.* p. 128; *Darwin, Dom. Anim.* ii. p. 75.

The British Museum has a series of thirteen skulls of the Domestic Pig; all have very similar characters (see Gray, *P. Z. S.* 1862, p. 16). They are known by the shortness of the skull, the side of the nose being bluntly keeled, the cheeks concave, the concavity extending up to the edge of the orbit and separated from the aperture of the orbit by only a narrow ridge; the frontal line is more or less concave.

The skull of the male has a distinctly marked transverse ridge on the base of the sheath of the upper canine; in the young male it is only slightly indicated; in the skull of the female and young pigs it is not to be seen.

717 a. Skull of an old male from Africa, from the Gambia (*Sus gambianus*, Gray, *List Mamm. B. M.*; Gerrard, *Cat. Bones B. M.* 277). Forehead flat (see *Sus scrofa hybridus*, West-African Pig, Selater, *P. Z. S.* 1862, p. 325).

713 *h*. Skull of an old male, from Africa. Forehead rather convex.

713 *r*. A very similar skull of an old male, purchased at a sale.

713 *o* and 713 *t*. Two nearly adult skulls, from the Museum of Dr. de Jeude.

713 *p*. A skull of an old specimen, diseased, from the Zoological Society's Gardens.

716 *r*. A skull of a young specimen from India, from the Museum of the Zoological Society; inscribed with Indian characters. Named *Sus indicus*.

713 *g*. Skull of a young Berkshire Sow.

713 *e*. Skull of a young Domestic Pig.

713 *s*. The skull of a very young Domestic Pig. This skull has an abnormality in the cutting-teeth. There are six in the upper jaw; the first two are in their natural position, and in their proper place; the two hinder ones on each side are close together, just in front of the suture of the intermaxillary bone, the front one being elongated, slender, conical, and bent outwards, and the hinder one short, broad, conical, and compressed. The canine on the right side is double; that is to say, the new one has appeared before the old one has been shed.

713 *w*. Skull developing its last grinder, from the Museum of Dr. de Jeude.

713 *t*. Skull of an adult, with the nose of the skull more elongated; from the Utrecht Collection. Probably half-bred between the Wild Boar and the Domestic Sow; it has the flat forehead, concave facial line, and the keeled side of the nose before the orbit of the Domestic Pig, and the length of the face like the wild breeds.

## 5. CENTURIOSUS.

Face deeply and symmetrically furrowed. Ears very large, falling down. Tail moderate. Skull—forehead and upper part of the nose flat, smooth, keeled on the sides; sides of the cheek concave; the sheath of the upper canine tubercular above; upper canines coming out in the lower edge of the jaws, and then bent upwards; palate broad.

*Centuriosus*, Gray, *P. Z. S.* 1862, p. 17, 1868, p. 40.

*Gyrosus*, Gray; *Gerrard, Cat. Bones B. M.* 1862.

*Ptychochoerus*, Fitz. *Sitz. Akad. d. Wissen.* 1864.

This genus is most allied to *Potamochoerus* in the form of the skull, and to *Sus* in its external appearance. It is not likely to be a cross breed between the two genera.

### *Centuriosus pliciceps*.

B.M.

Ears large, flat, rounded at the end, pendulous. Fur with scattered black bristles. Skin blackish grey. Limbs and beneath whitish.

*Sus* (*Centuriosus*) *pliciceps*, Gray, *P. Z. S.* 1861, p. 263, 1862, p. 14 (fig. of skull), p. 15 (fig. of palate).

- Sus* (*Gyrosus*) *pliciceps*, Gray, *MS.*; *Gerrard, Cat. Bones B. M.* p. 278; *P. Z. S.* 1864, pp. 160, 383.  
*Sus scrofa*, var. *pliciceps*, *Sclater, List Vert. Anim. Gard. Zool. Soc.* ed. 3. p. 36; *P. Z. S.* 1862, p. 322.  
*Ptychochoerus plicifrons*, *Fitz. Sitz. Akad. d. Wissen.* 1864, p. 409; *Führ. z. Zool. Garten z. München*, p. 23.  
*Centuriosus pliciceps*, Gray, *P. Z. S.* 1868, p. 41.  
 Japanese Masked Pig, *Bartlett, P. Z. S.* 1861, p. 263 (figure); *Illustr. London News*, 1862, no. 1126 (figure).  
 Chinesisches Maskenschwein, *Schmidt, Zool. Gart.* 1862, p. 80.

*Hab.* Japan; China. Male in the Gardens of the Zoological Society in 1864.

Evidently a domestic variety; the ears are pendulous, like those of most domestic animals. The young are of a uniform colour like the parents, and not striped like the wild species.

The skull in the British Museum (no. 1387 *a*), figured in the 'Proc. Zool. Soc.' 1862, is very unlike any of the skulls of the Domestic Pig in the Museum collection, especially in the breadth of the nose and the rounder form of the tubercle on the base of the sheath of the upper canine.

Skeleton of a very old animal (no. 1387 *b*), from the Zoological Gardens. The forehead between the orbits deeply depressed; nasal bones very flat.

- B. ABNORMAL SWINE (*BABIRUSSINA*). *Cutting-teeth*  $\frac{4}{5}$ ; *intermaxillary, and maxilla in front, produced, forming a long diastema between the cutting-teeth and the grinders. Canines erect, parallel; the sheath of the upper canine bent up from the base, and closely applied to the side of the jaw. Premolars*  $\frac{3}{5}$ ,  $\frac{3}{5}$ ; *the front one very small, and early deciduous.*—Gray, *P. Z. S.* 1868, p. 41.

There are two large oblong deep cavities at the hinder part of the depression behind the hinder nasal opening, separated from each other by a sharp, high, central, longitudinal lamina, that are not to be observed in the skulls of other *Suidæ*.

These depressions seem to become deeper as the animal increases in age. I have only observed them in specimens which have well-developed canines; they may be confined to the males.

There is in the British Museum a small skull, obtained from Holland (7180), of a half-grown animal, which has developed its second true grinder, and which is without canines, only having a slight ridge on the bone at the place where they are developed in the other skulls. The skull has no indication of the depression in the hinder part of the hinder nasal opening, and the grinders are much smaller than those in any other skull. Is it the skull of a female, or does it belong to a distinct species allied to *Babirusa alfurus*?

The prolongation of the skull in front and the length of the separation of the cutting-teeth from the grinders are produced by the prolongation of the maxilla in front and the elongation of the intermaxilla behind. The first premolar is very early deciduous; it is



only to be observed in skulls of young animals; but the spot where it was placed is sometimes indicated by a porous structure in the full-grown skull, as in specimen no 7187.

### 6. BABIRUSSA.

Face conical, simple. Ears rounded. Tail and limbs slender. Skull conical; nose elongate, simple; the hinder upper part of the intermaxillary bones smooth; the upper cutting-teeth large, equal, equidistant; the sheath of the upper canine bent upwards from the base at the side of the jaw; canines arched backwards, sometimes even spirally recurved; lower premolar compressed.

Babiroussa, *Gray, Ann. Phil.* 1825.

Babiroussa, *F. Cuv. Dent. Mamm.* p. 212, t. 86 \*.

Babirussa, *F. Cuv. Dent. Mamm.*; *Lesson, Mam.* p. 338; *Gray, List Mamm. B. M.* p. 185; *P. Z. S.* 1852, p. 131, 1868, p. 42; *Gerrard, Cat. Bones B. M.* p. 278.

*Porcus*, *Wagler, Syst.* p. 17; *Fitz. Sitz. Akad. Wissen.* 1864, p. 435.

M. F. Cuvier, when adopting this genus, described and figured the grinders as small and nearly equal-sided (see *Dent. Mamm. t.*); but this is a mistake; they are as large and elongate as the grinders of the other Pigs, compared with the size of the skull. This genus was first distinctly characterized in the 'P. Z. S.' 1852, p. 131.

#### Babirussa alfurus.

B. M.

"Fur ashy; dorsal streak yellowish brown; beneath ferruginous-washed."

*Aper orientalis*, *Brisson, Règn. Anim.* p. 110.

*Sus babyrussa*, *Linn. S. N.* p. 50; *Quoy & Gaim. Voy. Astrol. Zool.*

i. p. 125, t. 22, 23; *Isis*, 1836, t. 13; *Schinz, Monogr.* iv. p. 5, t. 5.

f. a-d; *Blainv. Ostéogr.* t. 2, t. 5 (skull, ♂).

*Sus babiroussa*, *Bodd. Elench.* i. p. 157.

*Sus babirussa*, *Schreb. Säugeth.* t. 328; *Blainv. Ostéogr. Onguligr.* t. 2 (skeleton, ♀), t. 5. f. 7 (skull and teeth).

*Babirussa alfurus*, *Lesson, Mamm.* p. 338; *Gray, List Mamm. B. M.* p. 185; *P. Z. S.* 1868, p. 42; *Sclater, P. Z. S.* 1860, p. 443, t. 83 (from life); *Gerrard, Cat. Bones B. M.* p. 279.

*Porcus babyrussa*, *Wagler, Syst.* p. 17; *Schreb. Säugeth. Supp.* v. p. 509; *Fitz. Sitz. Akad. d. Wiss.* 1864, p. 43; *Giebel, Säugeth.* p. 232.

*Porcus babirussa*, *Reichb. Nat. Pachyd.* p. 57, t. 54. f. 197, 199.

*Aper* in India, *Plinii Hist. Nat.* vii. p. 52.

Horned Hog, *Green, Mus. R. S.* p. 27, t. 1 (skull).

*Babyroussa*, *Bontius, Ind. Orient.* t. 1. fig.

*Babyrussa*, *Jacob, Mus.*

*Babi roessa*, *Seba, Thes.* i. t. 50. f. 2.

*Babiroussa*, *Buffon, H. N.* xii. p. 379, t. 48.

*Hab.* Borneo; Malacca?; Celebes; Ceram; Timor; Java; Sumatra; New Guinea; New Ireland (*Fitzinger*).

## Fam. 6. DICOTYLIDÆ.

Teeth 38:—Cutting-teeth  $\frac{3}{2} . \frac{3}{2}$ ; canines  $\frac{1}{2} . \frac{1}{2}$ ; premolars  $\frac{3}{2} . \frac{3}{2}$ ; molars  $\frac{3}{2} . \frac{3}{2}$ . Tail short. Teats 2.

Chæropotamidæ, *Owen, Odont.* p. 559 (not characterized).

Dicotylidæ, *Gray, P. Z. S.* 1868, p. 43.

Dicotyles, *Curier, Règ. Anim.* i. p. 237, 1817; *F. Cuv. Dent. Mamm.* p. 210, t. 84; *Owen, Odont.* p. 559; *Baird, Mamm. N. A.* p. 627, t.; *Fitzinger, Setigera*, p. 420, 1804.

Notophorus, *Fischer, Zool.* 1810.

These animals do not breed with the Domestic Pig, or any of the genus *Sus*. They have not been domesticated, and very rarely breed in confinement. The two species, a male (*Dicotyles labiatus*) and female (*Notophorus torquatus*), bred together in the Zoological Gardens, 1864; they have only two teats, and have two at a birth.

Mr. E. Gerrard, in the 'Catalogue of Bones of Mammalia in the British Museum,' has pointed out that the Collared Peccary has six and the White-lipped Peccary nine caudal vertebræ (p. 289).

M. F. Cuvier, in 'Dent. Mamm.,' observes that his description of the teeth is taken from the Peccary (*N. torquatus*), and the figure from the Tagassu (*D. labiatus*); and he continues, "The hinder molar of the lower jaw of *D. labiatus* is terminated by a single tubercle as large as the others, and not by three small ones."—*Dent. Mamm.* p. 211. I cannot see any difference in the form of the crown of the last grinder of the two species. The teeth, like the skull, are much the largest in *D. labiatus*. See description of dentition (*Owen, Odont.* p. 560).

## 1. NOTOPHORUS.

Skull—side of the face in front of the orbit dilated, spread out, deeply concave beneath; the longitudinal ridge on the cheeks nearly parallel with the tooth-line; orbit small, incomplete behind, with a concave half-ring beneath, on the cheeks and upper part of the front of the zygomatic arch; occipital end much dilated on the sides, forming a case for the hinder part of the temporal muscle. Teeth moderate. Tail rudimentary; caudal vertebræ six (*Gerrard*).

Notophorus, *Gray, P. Z. S.* 1868, p. 43.

De Blainville's figure of the skull on the skeleton (*Onguligrades, Sus*, t. 3) is not characteristic; the concavity in front of the lower part of the orbit is not sufficiently marked. The skull figured as that of *Sus torquatus* on tab. 5 is that of *Dicotyles labiatus*.

Dr. Spencer Baird's figure of the skull (t. 87) is much shorter and more ventricose than any of our specimens; the form of the ridge on the cheek is very imperfectly represented.

**Notophorus torquatus.** (Peccary.)

B.M.

Black-brown, yellow-washed; neck and shoulders with a white streak.

*Sus tajacu*, *Linn. S. N. i.* p. 103.

*Sus tajassu*, *Ercleb. S. R. A. i.* p. 188.

*Sus torquatus*, *Blainv. Ostéogr. Onguligr.* *Sus*, t. 3 (skull), t. 8 (teeth).

*Dicotyles torquatus*, *Cuv. R. A. i.* p. 237; *F. Cuv. Dent. Mam.* t. 86.

f. 1; *Mamm. Lithogr. i. t.*; *Fitz. Sitz. Ak. d. Wiss.* 1864, p. 49;

*P. Z. S.* 1859, p. 51, 1860, pp. 181, 206, 242, 262, 417, 443; *Baird*,

*M. N. A.* p. 627; *Blainv. Ostéogr.* t. 3 (skeleton), t. 5 (skull).

*Dicotyles minor*, *Schinz, Cuv. Thierr.* iv. p. 511 (jun.).

*Dicotyles tajacu*, *Gray, List Mamm. B. M.* p. 186; *Gerrard, Cat.*

*Bones B. M.* p. 280.

*Notophorus torquatus*, *Gray, P. Z. S.* 1868, p. 44.

*Cuche, Oviedo.*

*Vagassou, Lerijs, Nav. in Bras.* p. 115.

*Saynos, Acosta, H. N. Indias*, p. 287.

*Zainus sive Tajacu, Jonst. Quad.* p. 107, t. 46.

*Tajacu, Piso, Ind.* p. 98, fig.; *Raii Syn. Quad.* p. 97.

*Peccary, Wafer, Voy.* p. 222.

*Musk-Hog, Tyson, Phil. Trans.* cliii. p. 359; *Hill. Anim.* p. 572.

*Pecari ou tajacu, Buffon, H. N. x.* p. 21, t. 3. f. 27, t. 5. f. 13.

*Mexican Hog, Penn.*

*Pecari, Shaw.*

*Hab.* South America: Mexico, Red River, Arkansas, Guiana, Brazil, Paraguay, Peru, California (*Baird*).

*Notophorus torquatus* had a young one in 1860, the first occasion that the animal has bred in confinement in England (*Sclater, P. Z. S.* 1860, p. 443).

The skulls of the three old [males?], having large canine teeth, are rather larger than the other, and they have a well-marked oblong slightly sunk concavity in front of the orbits.

One adult skull, in the Museum, with large short thick canines, has this part of the skull, which is concave in the three other skulls above referred to, flat.

The angle of the lower jaw in the old skull becomes much dilated, with a produced lower edge, making the skull appear higher than the skull from an animal with all its teeth just developed, as 720 h.

## 2. DICOTYLES.

Skull—side of the face in front and on the underside of the orbits flattened, with a well-marked ridge on its lower edge; orbits small, incomplete. The longitudinal ridge on the cheeks bent up in an arched manner in front of the orbits, and then slightly indicated parallel to the line of the forehead, becoming a large concavity on the cheek beneath. Teeth large (see *Blainv. Ostéogr. Onguligr. Sus*, t. 5, figured as *Sus torquatus*). Tail rudimentary; caudal vertebrae nine (*Gerrard*).

*Dicotyles*, *Gray, P. Z. S.* 1868, p. 45.



**Dicotyles labiatus.**

B.M.

Black-brown, varied with yellowish; no neck-bands; lower jaw white.

*Sus tajassu*, *Erzleb. S. Rög. Anim.* i. p. 185.

*Sus albirostris*, *Illig., Licht. Verz. d. Doubl. Berl. Mus.* p. 3.

*Dicotyles labiatus*, *Cuv. R. A. i.* p. 237; *F. Cuv. Dent. Mamm.* p. 210, t. 86. f. 2; *Mamm. Lith.* xxvii. t.; *P. Z. S.* 1848, p. 70, 1860, p. 262;

*Gray, P. Z. S.* 1868, p. 45.

*Sus labiatus*, *Gerrard, Cat. Bones B. M.* p. 281; *Blainv. Ostéogr. Onguligr.* t. 3 (foot).

*Dicotyles albirostris*, *Wagner, Schreb. Säugeth. Suppl.* iv. p. 306; *P. Z. S.* 1860, pp. 262, 442, 443.

*Dicotyles torquatus*, *Blainv. Ostéogr. Sus*, t. 5 (skull).

Cuche, *Oviedo, H. N. de las Indias*, p. 21.

Saynos, *Acosta, H. N. de las Indias*, p. 287.

*Tayacutericus*, *Laet, Nov. Orb.* p. 551.

*Tagnicati*, *Azara, Paraguay*, i. p. 25.

*Hab.* South America; Guiana, Brazil, Paraguay, Peru.

The skulls are shorter, and the ridge on the cheek is not so large and distinctly marked in younger animals as in the adults. The alveolus for the hinder grinders, which are about to be developed, is a kind of sheath with a slit along the middle of its exposed side.

The skulls of the young animals changing their teeth sometimes show two small conical canines on each side of the upper jaw, as 721 a, 721 b.

\*\* *The premolars deciduous, their place being filled up by the development of the molars.*—Gray, *P. Z. S.* 1868, p. 45.

**Fam. 7. PHACCHÆRIDÆ.**

Grinders formed of laminæ, with numerous roots. Canines cylindrical, conical; the upper bent upwards. Eyes and nostrils on a level with the top of the head. Young not streaked.

*Phacochæridæ*, *Gray, P. Z. S.* 1868, p. 45.

*Hab.* Africa. Lives floating among reeds. Intermediate between *Suidæ* and *Hippopotamidæ*.

**PHACCHÆRUS.**

Cutting-teeth  $\frac{3}{3} . \frac{3}{3}$ , deciduous; canines  $\frac{1}{1} . \frac{1}{1}$ ; grinders  $\frac{6}{6} . \frac{6}{6}$ ; premolars  $\frac{3}{3} . \frac{3}{3}$ . The premolars fall out, and their places are eventually filled by the molars, as the large molar is developed and gradually increased in length by the addition of a new plate to its hinder edge (see *Blainv. Ostéogr., Sus æthiopicus*, t. 8).

Phacochæres (Phacochærus), *F. Cuv. Dent. Mam.* p. 213, t. 87.  
 Phasochærus, *F. Cuv. Mém. Mus.* viii. p. 454; *I. Geoff.*; *A. Smith.*  
 Phacochærus, *F. Cuv. Dent. Mamm.* p. 213, t. 87; *Temm.*; *Reichenb.*;  
*Giebel, Säugeth.* p. 235; *Peters*; *Owen, Odont.* p. 549, t. 141. f. 2;  
*Fitz. Setigera*, p. 415, 1864; *Gerrard, Cat. Bones B. M.* p. 279.  
 Euredon, *G. Fischer, Zoogr.*

See for dentition of *Phacochærus*, and the changes in it, 'Owen, Odont.' p. 549, t. 140. f. 4, t. 141. f. 1. He figures the premolars, the fourth being the first tooth of the permanent series.

The whole series of teeth is never or very rarely to be seen complete, as the last molar is rarely apparent until the first two or three premolars have fallen out.

### Phacochærus æthiopicus.

B.M.

Fur dull ashy brown, beneath whitish; ears and beard on cheeks whitish.

Sanglier du Cap Vert, *Daubenton*; *Buffon, H. N.* xiv. p. 409, xv. p. 148.  
 Sus æthiopicus, *Erxleb. Syst. R. A.* i. p. 187; *Griffith, A. K.* iii. p. 410, fig.; *Blainv. Ostéogr. Onguligr.* Sus, t. 5.  
 Sus africanus, *Gmelin, S. N.* i. p. 220; *Home, Comp. Anat.* ii. t. 39 (skull, adult).  
 Phasochærus africanus, *F. Cuv. Mém. du Mus.* viii. p. 454, t. 23; *Lesson, Mamm.* p. 341.  
 Phasochærus incisivus, *I. Geoff. Dict. Class. H. N.* xiii. p. 32.  
 Phacochærus africanus, *F. Cuv. Dent. Mamm.* p. 215, t. 87. f. b; *Fischer, Syn. Mamm.* p. 424; *Peters, Mossamb.* p. 181; *Giebel, Säugeth.* p. 237.  
 Sanglier d'Afrique, *Adanson, Sénégal*, p. 76.  
 Aper æthiopicus, *Pallas, Misc.* p. 16, t. 2; *Spicil.* ii. 3, t. 1, xi. t. 5. f. 7.  
 Sus æthiopicus, *Linn. S. N.* i. p. 223; *Blainv. Ostéogr.* t. 5 (skull), t. 8 (teeth).  
 Engalla, *Merol. Cong.* p. 667.  
 Porc à large groin, *Vosm. Descrip.* 1767.  
 Engallo, *Buffon, H. N. Supp.* iii. p. 76, t. 11.  
 Ethiopian Hog, *Penn.*  
 Sus angalla, *Boddaert, Elench. A.* i. p. 150.  
 Phasochærus æthiopicus, *F. Cuvier, Mém. du Mus.* viii. p. 450, t. 23; *Dent. Mamm.* p. 215, t. 87. f. a.  
 Phasochærus Æliani, *Riippell, Atlas*, t. 25, 26.  
 Phacochærus barbatus, *Temm. Monog.* i. p. 29.  
 Phacochærus haroja, *Ehrenb. Symb.* ii. t. 20.  
 Phacochærus Æliani, *Gray, List Mamm. B. M.* p. 185; *Reichb. N. Pachyd.* p. 36; *Sclater, P. Z. S.* 1864, p. 106; *Gerrard Cat. Bones B. M.* p. 280; *Owen, Odont.* p. 549.  
 Phacochærus æthiopicus, *Home, List Comp. Anat.* ii. t. 38, 39; *Gray, P. Z. S.* 1868, p. 46.  
 Cape Verd Hog, *Shaw, Penn.*  
 Phasochærus africanus, *Desm. Mamm.* p. 593; *A. Smith, Cat. S. A. Mus.* p. 16.  
 Phasochærus edentatus, *I. Geoff. Dict. Class. H. N.* xiii. p. 320.  
 Phasochærus typicus (African Boar), *A. Smith, S. African Quart. Journ.* p. 90.  
 Phacochærus æthiopicus, *Fischer, Syn. Mamm.* p. 424; *P. Z. S.* 1850,

- p. 78, 1860, p. 443; *Gray, List Mamm. B. M.* p. 185; *Giebel, Säugeth.* p. 236; *Fitz. Sitz. Akad. d. Wissen.* 1864, p. 39.  
*Phacochærus africanus*, *Harris; Kirk, P. Z. S.* 1864, p. 656.  
*Phacochærus Pallasii*, *Van der Hoeven, Nov. Act. Leop.* xix. i. p. 171, t. 18; *Owen, Ann. & Mag. N. H.* 2nd ser. xi. p. 246; *Odont.* p. 553, t. 140. f. 4 (teeth); *P. Z. S.* 1851, p. 63.  
*Phacochærus aper æthiopicus*, *Reichenb. N. Pachyd.* p. 35, t. 32. f. 111, 112.

*Hab.* Africa: Central Africa, Tete, &c. (*Kirk*); Guinea, Senegal (*Adanson*); Mossambique (*Peters*); South Africa, called "Kau-naba;" Abyssinia; Arabia.

"Native name 'Jiri' or 'Njiri' at Tete; in Sechuana, 'Kolobe.'" —*Kirk, P. Z. S.* 1864, p. 656.

M. F. Cuvier divides *Phacochærus* into (1) *Phacochæres* à incisives, *P. africanus*; (2) *Phacochæres* sans incisives, *P. æthiopicus*, Gmel. (*Dent. Mam.* pp. 257, 213). He adds, "Notre dessin est tiré, pour la mâchoire supérieure d'un *Phacochaere* sans incisives, et pour la mâchoire inférieure d'un *Phacochaere* pourvu d'incisives, et nous ferons remarquer que les disques des dernières molaires du premier sont moins grands et moins nombreux que ceux de la dernière molaire du second, serait-ce encore un caractère spécifique?"—*Dent. Mamm.* p. 213.

The size and number of the disks on the crown of the last grinder depend on the age of the tooth and how much of the surface has been worn down.

In the British Museum there are three skeletons and fourteen skulls or parts of skulls. The skulls of ten of these have two incisors in the upper jaw, and seven are without any incisors in the upper jaw, as marked in Mr. Gerrard's 'Catalogue of Bones,' p. 280. Two of these skulls belong to skeletons of a male and female *Phacochere* that were brought together from Africa, and lived several years in the Gardens; they are both destitute of upper cutting-teeth. Another skeleton of a female that lived in the Zoological Gardens has two cutting-teeth in the upper jaw; so the existence or non-existence of the upper cutting-teeth is not a sexual character.

The presence or absence of the upper cutting-teeth does not depend on the age of the animal; for there are specimens without any cutting-teeth that have the premolars still present and the hinder molar small, and there are specimens which have the cutting-teeth that have lost or are losing the premolars and have the hinder molar very large and well developed.

Nine of the skulls or front parts of the upper jaws were bought of Mr. Argent, who purchased them all together with a collection of Cape skins; five of these upper jaws have distinct cutting-teeth, and four of them are without any indications of them; therefore the presence or absence of the upper cutting-teeth is common to animals inhabiting the same locality, not peculiar to the *Phacocheres* of certain districts of Africa as has been supposed.

Professor Sundevall observes, "*Sus (Phacoch.) Eliani*, Crzm.; *Ph. harroya*, Ehr., in Caffraria a Wahlbergio inventus est. Plura



specimina utriusque sexus retulit, nullum vero *Suis æthiopicæ* ibi vidit."—*Öfversigt K. V. Akad. Förh.* 1846, p. 121.

I cannot discover any difference between the skull which we received from Professor Sundevall as *P. Æliani* from Caffraria and the skulls without cutting-teeth which were obtained from Mr. Argent, which are called *P. æthiopicus*.

There is no difference, as far as I can see, except size, between the very large skull of a male from Cape Verde, that was given to the Museum by Mr. T. Tatum, and the skulls from South Africa and Caffraria in the Museum collection, and the skull figured by Dr. Rüppell as the type of his *P. Æliani*.

It is said that *P. æthiopicus*, without upper cutting-teeth, has a soft sac under the eyes, which is not to be observed in *P. africanus*, that has cutting-teeth in the upper jaw. Perhaps this may be a sexual character; for it was a male *P. æthiopicus* that was first described, with a large mane of slight bristles.

The teeth in the lower jaw are generally well developed and large. There is one skull in the British Museum, from Mr. Argent, in which they are nearly worn away to the roots; they are small. This skull has no upper incisors. De Blainville figures a lower jaw in which they are entirely absent, and another in which there are only two very small teeth (*Ostéogr. Sus*, t. 5, *Sus æthiopicus*).

It has been proposed to divide *Phacocoerus* into two species, thus characterized:—

*P. æthiopicus*. Head short; forehead convex; cutting-teeth none above, and small and deciduous below.

*P. Æliani*. Head elongate; forehead convex; cutting-teeth two in upper, six in lower jaw, both large and exerted.

I cannot find any difference in the form of the head and forehead between the specimens with and without cutting-teeth in the upper jaw. The head is as long and the forehead is as concave in the skulls that are destitute of upper cutting-teeth as in those that have them well developed.

There is a considerable variation in the skulls. The skull of the male from the Zoological Gardens is much broader, and the forehead more concave, than the skulls of the females from the same collection; but these are from animals that have been kept in confinement. The teeth of the old male are greatly deformed, the grinders being absent on one side of the upper and on the opposite side of the lower jaw, the teeth working into cavities in the alveolar surface. The nose of the skull below the base of the canines is much broader and more rounded and arched in the males than in the females. The upper canine teeth are nearly of the same form in the two sexes; those of the males are much the thickest.

The skull from Cape Verde is longer in proportion to its width than any of the other skulls, the line along the upper surface of the skull being full three times the length of the width between the upper edges of the orbits. In other skulls it is twice and a half, or rather more than twice and a half, the width at the same part of the skull. I cannot see any other character to separate it.

"The Wild Pigs of Obbo, Central Africa, live under ground; they take possession of the holes made by the *Manis*; these they enlarge and form cool and secure retreats."—Baker, '*Albert N'yanza*,' ii. p. 66.

Subsection II. *The front part of the jaws dilated and truncated. The nostrils on the upper surface of the nose, closed by a valve. Eyes high up on the sides of the head, on a line with the base of the ears. Aquatic.*

### Suborder VI. OBESA.

Face wide, depressed; eyebrow and orbit higher than the forehead; mouth very wide, large. Cutting-teeth of each jaw cylindrical, elongate, projecting, tusk-like. Canines in each jaw very large, obliquely truncated. Limbs weak. Toes 4.4, nearly of the same length, radiating, all reaching the ground, more or less free. Tail compressed, short.

Obesa, *Illiger*, *Prodr.* 1811.

## Fam. 8. HIPPOPOTAMIDÆ.

*Hippopotamus*, *Linn.*, *Illiger*; *Cuvier*, *Règne Anim.*

*Hippopotamidæ*, *Schinz*, *Syst. Verz.* p. 342; *Owen*, *Odont.* p. 563, t. 141. f. 4; *Falconer*, *Pal. Mem.* ii. pp. 405, 406.

*Hippopotamina*, *Gray*, *Ann. Phil.* 1825; *Giebel*, *Säugeth.* p. 214.

They live in lakes and rivers; on the coast they go to the sea and play among the surf.—*Kirk*, *P. Z. S.* 1864.

"Essentially a gigantic Hog."—*Owen*, *Odont.* p. 371.

The fossil genera *Hexaprotodon*, *Falconer*, *Merycopotamus*, *Falconer*, and *Choerotherium*, *Brandt*, appear to belong to this family.

### 1. HIPPOPOTAMUS.

Cutting-teeth four in each jaw; premolars  $\frac{4}{4}$ , molars  $\frac{3}{3}$ .  $\frac{3}{3} = 28$ .

*Hippopotamus*, *Linn. S. N.*

*Hippopotamus*, § 1. *Tetraproctodon*, *Giebel*, *Säugeth.* p. 217.

*Hippopotamus amphibius*. (Zeekoe or River-horse.) B.M.

*Hippopotamus amphibius*, *Linn. S. N.* p. 101; *Gray*, *List Mamm. B. M.*; *Gerrard*, *Cat. Bones B. M.* p. 284; *P. Z. S.* 1849, p. 163, 1850, p. 160, 1860, p. 195; *Smith*, *Illustr. Zool. S. A. t.*; *Blainv. Ostéogr. Onguligr.* t. 1-7 (var. du Cap, du Sénégal, d'Egypte); *Peters*, *Berlin Monatsb.* 1854, p. 367.

*Hippopotamus capensis*, *Desm. Journ. Phys.* v. p. 354; *Dict. Class. H. N.* viii. p. 222.

*Hippopotamus senegalensis*, *Desm. Journ. Phys.* v. p. 354; *Dict. Class. H. N.* viii. 222.

*Hippopotamus abyssinicus*, *Lesson, Mamm.*

*Hippopotamus typicus et Hippopotamus australis*, *Duvernoy, L'Institut*, 1846, p. 333.

*Hab.* North, South, West, and Central Africa.

I have not been able to discover any difference between the skulls received from South, North, or Central Africa.

There is a fœtus in spirits in the British Museum.—*Gray, P. Z. S.* 1868, p. 491, f. 2.

Fig. 40.



Fœtus of *Hippopotamus* of the natural size.

## 2. CHÆROPSIS.

Cutting-teeth four in each jaw.

*Chæropsis*, *Leidy, Journ. Acad. N. S. Philad.* ii. 3. p. 207, 1853.

? *Diproctodon*, *Duvernoy*, 1849.

*Tetraproctodon*, sp., *Falconer, Pal. Mem.* ii. p. 405.

### *Chæropsis liberiensis*.

B.M.

*Hippopotamus minor*, *Morton, Journ. Acad. N. S. Philad.* 1844, p. 14; *Ann. & Mag. N. H.* 1844, xiv. p. 75.

*Hippopotamus liberiensis*, *Morton, Trans. Acad. N. S. Philad.* 1849; *Fror. Tagsber.* 1850, p. 73; *Duvernoy, Institut*, xvii. 1849, p. 299.

*Chæropsis liberiensis*, *Leidy, Journ. Acad. N. S. Philad.* 1853, p. 207, t. 21.

*Hippopotamus (Tetraproctodon) liberianus*, *Gerrard, Cat. Bones B. M.* p. 284.

*Tetraproctodon liberiensis*, *Falconer, Pal. Mem.* ii. p. 405.

*Hippopotame de Libérie*, *Milne-Edwards & Alph. M.-Edw. Recherches des Mammifères*, 1868, t. 1. f. 2, 3 (animal and skeleton).

*Hab.* West Africa; Liberia (*Morton*).

Cast of skull in British Museum, presented by G. S. Morton, Esq.



## Section II. HETEROGNATHA.

The front of the jaws contracted and bent down ; the upper one bent down on the slanting upper surface of the lower one. The upper and lower cutting-teeth, when present, produced in the form of projecting tusks ; canines none. Teats pectoral. Limbs well developed or rudimentary and fin-shaped.

## Suborder VII. PROBOSCIDEA.

Nose produced into a flexible proboscis, with a prehensile lobe on the upper edge. Limbs well developed, separate, for walking. Toes 5 . 5, subequal, radiating, imbedded in the fleshy club-shaped foot, with nail-like hoofs.

Proboscidea, *Illiger, Prodr.* 1811 ; *Cuvier, Règne Anim.* 1817.

Proboscidiæ, *Owen, Odont.* p. 610.

Elephantidæ, *Gray, Ann. Phil.* 1825.

In each jaw two deciduous incisors, followed by two permanent incisors developed as tusks ; three deciduous molars on each side, followed by one premolar and three molars on each side. The lower tusk-like incisors are sometimes wanting (see *Owen, Palæontology*, p. 356, f. 114).

See collection of observations on the fossil Elephants of Europe and America in different collections, in *Falconer's 'Pal. Mem.'* pp. 71-307.

## Fam. 9. ELEPHANTIDÆ.

The grinders with a flat upper surface, with transverse enamel ridges formed of compressed plates united. Lower jaw smaller, tapering in front, regular-shaped, or rather produced in front, without any tusk ; the upper cutting-teeth produced into tusks ; the lower rudimentary or entirely absent. Neck short.

*Elephas, Linn.*

## 1. ELEPHAS.

Lamina of the grinders flat, with a linear crown. Skull high, forehead concave, vertex high. Trunk subcylindrical at the base. Ears moderate.

*Elephas, Linn. ; F. Cuvier, Dents Mamm.*

*Elephas indicus.*

B.M.

*Elephas indicus, Linn.*

*Elephas maximus, Linn. S. N.* p. 45.

*Elephas asiaticus, Blumenb. Abild.* t. 19. f. 10.

*Elephas indicus zeylanicus*, *Blainv. Ostéogr.* t. 1, 23.

*Elephas indicus bengalensis*, *Blainv. Ostéogr.* t. 7.

Var. ? *Elephas sumatranus*, *Temm. Coup d'œil* (B.M.); *P. Z. S.* 1849, p. 144.

*Hab.* India; Ceylon (?); Sumatra (B.M.).

The skeleton of the Sumatran Elephant, which the British Museum received from the Leyden Museum, has not the differences in the number of vertebræ from the Indian one that Temminck gives as characteristic of the Sumatran species.

Fœtus in the British Museum.—*Gray, P. Z. S.* 1868, p. 491, f. 1.

Fig. 41.



Fœtus of Indian Elephant of the natural size.

## 2. LOXODONTA.

Lamina of the teeth with lozenge-shaped crown. Skull subglo-bular, forehead shelving, crown rounded; front of lower jaw acute, produced. Trunk conical, thick at the base. Ears very large.

*Loxodonta*, *F. Cuvier, Dents Mamm.*

***Loxodonta africana.*** (African Elephant.) B.M.

*Loxodonta africana*, *Gray, List Mamm. B. M.* 1843; *Gerrard, Cat. Bones B. M.*

*Elephas africanus*, *Blumenb. Albild.* t. 19. f. c; *Kirk, P. Z. S.* 1864, p. 654; *Giebel, Säugeth.* p. 159; *Blainv. Ostéogr.* Gravigrades, t. 3 (skull), t. 7 & 9 (teeth).

*Elephas maximus* (part.), *Linn.*

*Hab.* South Africa, Cape of Good Hope; West Africa; East Africa, Mossambique.

See *E. insignis* and *E. planidens*, *Falconer, Palæont. Mem.* i. t. 4; *E. ganesa*, *Falconer, Palæont. Mem.* i. t. 6. f. 1.

Professor Owen thinks that the depth of the cleft between the laminæ of the teeth of some of the Asiatic fossil Elephants may form a passage to the Mastodons (see *Palæont.* p. 356).

This suborder is particularly rich in fossil genera. The family of *Mastodontidæ*, with their tubercular grinders and elongated cylindrical tusks in the lower jaw, contains the genera *Mastodon* (Cuvier),

*Stegodon*, *Trilophodon*, and *Tetralophodon* (Falconer), and perhaps *Elasmotherium* (Fischer).

Here also should probably be referred the family *Dinotheriidae*; but unfortunately a part of the head of these animals only is known. They seem to form a passage to the fish-shaped *SIRENIA*, which are evidently much more allied to these Bruta than to the Cetacea, with which they have hitherto been classed. I refer, for the specimens of these animals in the British Museum, to the 'Catalogue of Seals and Whales,' which has lately appeared.

It is impossible to arrange with certainty a multitude of genera or pseudo-genera established upon fragments of bones.

It is constantly asserted that if you give a palæontologist a fragment of a bone, or even a single tooth, he will be able to build up a complete animal and show you its proper position in the system; but one has only to observe the history of some fossil species, as shown by their synonyms, to see that this is a very great overstatement of the case, and that even with large portions of the skeletons and many teeth there is great uncertainty as to their position in the system, and as to the alliances of fossils, even in the works of the leaders in the science. Cuvier described the *Dinotherium* and some *Manati* as Tapirs; but then only the teeth were known. More recently a fossil skull with teeth from Australia has been described as a carnivorous Marsupial (*Thylacoleo*). It is now believed to be only a leaf-eating Marsupial, nearly allied to the genus *Cuscus*. A multitude of similar instances might be mentioned.



## Order BRUTA.

Teeth of one or two kinds, all very similar, often entirely wanting; grinders rootless. Limbs four, free. Toes united in the skin to the claws. Claws conical or compressed, elongate. Tongue elongate. Mammæ pectoral or abdominal.

*Bruta, Linn. S. N.; Bonap. Prod. Mastoz.*

### *Synopsis of Suborders and Families.*

Suborder 1. **Tardigrada.** Face short. Limbs elongate. Pelvis simple. Herbivorous.

Fam. 1. **BRADYPODIDÆ.** Grinders rootless, cylindrical; canines distinct, acute. Body covered with dry crisp hair. Fore limbs long. Tail very short or wanting. Teats pectoral. Tongue elongate.

Suborder 2. **Effodientia.** Face and tongue elongate. Limbs short. Pelvis simple. Insectivorous.

Section 1. *Body covered with scales, revolute. Teeth none. Cataphracta.*

Fam. 2. **MANIDIDÆ.** Body and tail covered with scales. Tail expanded. Claws of the feet bent on the sides in walking.

Section 2. *The body covered with a bony convolute armour, divided into rings or bands formed of tesserae, generally revolute. Teeth many.*

Fam. 3. **DASYPODIDÆ.** The dorsal disk closely attached to the back of the animal, divided in the middle into three parts by free rings separating the scapular and pelvic shields; pelvis free from the pelvic shield; scapular or pelvic shield moderate; central rings many; feet strong; hind toes free; claws large. Skull not soldered to the frontal shield. Tail elongate. **PELTOCHLAMYDES.**

Fam. 4. **TOLYPEUTIDÆ.** Scapular and pelvic shields large, convex; central rings three, only attached to the middle of the back, which is covered with hair on the sides under the shields. Feet weak; front with elongated unequal claws, on the top of which the animal walks; hinder feet clavate, with flat ovate nails; hind part of feet rounded, shielded. Skull attached to the frontal shield. Tail short. **SPHÆROCHLAMYDES.**

Fam. 5. CLAMYDOPHORIDÆ. The dorsal disk divided behind into a dorsal and a pelvic shield. The pelvic shield agglutinated to the pelvis. Feet strong; toes united; claws large.

Section 3. *Body covered with hairs or spines, not with scales or armour.*

Fam. 6. ORYCTEROPODIDÆ. Body covered with bristles. Head conical; mouth small. Teeth numerous.

Fam. 7. MYRMECOPHAGIDÆ. Body covered with hair. Head conical; mouth small. Teeth none.

Suborder 3. **Monotremata.** Pelvis with marsupial bones. Tongue elongate. Face like a beak. Insectivorous.

Fam. 8. ORNITHORHYNCHIDÆ. Body covered with hair or spines. Mouth in the form of a flat or cylindrical beak. Hind feet of males spurred.

### Suborder I. TARDIGRADA.

Face short. Limbs elongate. Pelvis simple. Herbivorous.

*Tardigrada, Illiger.*

*Bruta, Dahlbom.*

### Fam. 1. BRADYPODIDÆ.

Grinders more or less cylindrical; canines distinct, acute. Face round; neck short. Forelimbs very long. Tail very short or wanting. Body covered with dry crisp hair. Teats pectoral. Stomach 2- or 3-lobed. Tongue largely extensile (see Ball, P. Z. S. 1844, p. 93; Turner, P. Z. S. 1851, p. 207). Malar bone with an additional inferior process.

*Osteology.*—See Gray, P. Z. S. 1849; Turner, P. Z. S. 1851, p. 206.

*Bradypidæ, Gray, Annals of Philos.* 1825; *Cat. Mamm. B. M.* p. 192; *P. Z. S.* 1849, p. 65.

*Bradypodidæ, Bonap. Prod. Mastoz.*; Turner, P. Z. S. 1851, p. 206.

*Bradypodina, Bonap.*

*Bradypoda, Baird, N. A. Mamm.* p. 621.

#### *Synopsis of the Genera.*

1. **CHOLÆPUS.** Hands two-clawed; feet three-clawed. Front grinder large, like a canine.
2. **BRADYPUS.** Hands and feet three-clawed. Front grinder small. Pterygoid swollen, hollow, vesicular.
3. **ARCTOPITHECUS.** Hands and feet three-clawed. Front grinder small. Pterygoid compressed, crest-like, solid.

## 1. CHOLÆPUS.

Hands two-clawed; feet three-clawed. Front grinder large, like a canine. Pterygoid bone rather swollen, vesicular.

*Osteology*.—Cuvier, *Oss. Foss.* v. p. 73, t. 6, 7; Gray, *P. Z. S.* 1849, p. 65; Turner, *P. Z. S.* 1851, p. 207; Blainville, *Ostéogr.* t.

*Cholæpus*, Illiger, 1811; Gray, *P. Z. S.* 1849, p. 65; Rapp, *Edent.* *Bradypus*, F. Cuv. *Dents Mam.* t. 77.

1. *Cholæpus didactylus*. (Unau.) B.M.

“Cervical vertebræ 7; arms and claws long.”

*Bradypus didactylus*, Linn.

*Bradypus unau et Bradypus curi*, Link.

*Cholæpus didactylus*, Gray, *Cat. Mamm. B. M.* p. 192; *Proc. Zool.*

*Soc.* 1849, p. 65; Turner, *P. Z. S.* 1851, p. 206; Owen, *Odont.* t. 81.

f. 3, 4 (from Blainv.); Rapp, *Edent.* p. 4, t. 3. f. 2 (skull).

*Hab.* Brazil and Guiana.

2. *Cholæpus Hoffmanni*. B.M.

“Cervical vertebræ 6; arms shorter; claws short.”

*Cholæpus Hoffmanni*, Peters, *Monatsb. Akad. Berl.* 1858, p. 128; *Nat. Hist. Rev.* 1865, p. 300.

*Hab.* Porto Rico.

Dr. Peters has described the Sloth from Porto Rico as a species under the name of *Cholæpus Hoffmanni* (*Monatsb. Berl. Akad.* 1858, p. 128), because it has six cervical vertebræ; but the number of the free vertebræ in the genus appears from his own observations to be variable.

“Dr. Peters had received five skeletons of this Sloth, in all of which the number of cervical vertebræ was six. In four of the specimens these vertebræ were all separate; in the fifth specimen the second and third had become united, as is sometimes the case in *C. didactylus*; and in this example, moreover, the sixth cervical had coalesced with the first dorsal vertebra.”—*Nat. Hist. Rev.* 1865, p. 300.

## 2. BRADYPUS.

Hands and feet three-clawed. Front grinder small. Pterygoid swollen, hollow, vesicular (*P. Z. S.* 1849, t. 10). Skull flattened above on the forehead.

*Osteology*.—Cuvier, *Oss. Foss.* v. p. 73, t. 4, 5, 7; Gray, *P. Z. S.* 1849; Turner, *P. Z. S.* 1851, p. 207.

*Bradypus*, Illiger, 1811; Gray, *l. c.* 1849, p. 66; Rapp, *Edent.* p. 5.

? *Acheus*, F. Cuv. *Dents Mam.* t. 78.

*Arctopithecus*, Gesner.

“The female brought forth a young one whilst in my custody; she did not carry it on her back, but in her lap. Nevertheless, when the young one is older, it appears to me that the most con-



venient place would be the mother's back, with its long arms round her neck, and legs round her waist."—*H. Birchall, Zoologist*, 1865, p. 9517.

### 1. *Bradypus crinitus*.

B.M.

Grey, sides reddish; back of the neck with a mane formed of elongate black hairs.

*Bradypus tridactylus*, *Linn.*; *Owen, Odont.* t. 81. f. 1, t. 82.

*Bradypus variegatus*, *Schinz.*

*Bradypus torquatus*, *Illiger*; *Owen, Odont.* t. 81. f. 2; *Rapp, Edent.* p. 6.

*Bradypus cristatus*, *Temm.*

*Bradypus crinitus*, *Brown, Jam.* p. 89; *Gray, P. Z. S.* 1849, p. 67, t. 10. f. 1.

*Acheus torquatus*, *Geoffr.*

*Bradypus cuculliger*, *Peters.*

*Hab.* Brazil.

### 2. *Bradypus affinis*.

B.M., type.

Fur unknown; forehead of skull rather convex, &c.—*Gray, P. Z. S.* 1849, p. 68, t. 10. f. 2.

*Bradypus affinis*, *Gray*; *Turner, P. Z. S.* 1851, p. 208.

*Bradypus torquatus*, *Brandt, MS.*

*Hab.* Brazil.

### 3. *ARCTOPITHECUS*.

Hands and feet three-clawed. Skull rounded above on the forehead. Front grinders small. Pterygoid compressed, crest-like, solid.—*Gray, l. c.* t. 11.

*Osteology*.—*Gray, P. Z. S.* 1849, p. 69; *Turner, P. Z. S.* 1851, p. 208; *Cuvier, Oss. Foss.* v. t. 4, 5, 7.

*Arctopithecus*, *Gray, P. Z. S.* 1849, p. 69.

*Acheus*, part., *F. Cuvier, Dents Mam.* t. 78.

a. *Fur moderately rigid, the back white-spotted, dorsal streak elongate.*

#### 1. *Arctopithecus gularis*.

B.M.

Dark grey-brown; back white-varied, with an elongated black streak with a broad patch of soft hair on each side between the shoulders. Skull, &c.—*Gray, l. c.* t. 11. f. 6.

*Bradypus gularis*, *Rüppell, Mus. Senck.* iii. p. 138, t. 11; *Gray, Cat. Mam. B. M.* p. 193.

*Bradypus cuculliger*, *Wagler*; *Rapp, Edent.* p. 5, t. 3. f. 1 (skull).

*Arctopithecus gularis*, *Turner, P. Z. S.* 1851, p. 208.

*Hab.* South America; Guiana (*Rüppell*) B.M.; Bolivia (*Bridges*).

#### 2. *Arctopithecus marmoratus*.

B.M., type.

Grey-brown, back and outer side of the arms white-varied, with an elongated narrow streak extending nearly the whole length of

the back. The angle of the lower jaw much produced, narrow, sub-acute.—*Gray, l. c. t. 11. f. 3, 4.*

*Arctopithecus marmoratus, Gray, P. Z. S. 1849, p. 71, t. 11. f. 3, 4; Turner, P. Z. S. 1851, p. 208.*

*Bradypus infuscatus (female), Wagler, Isis, 1831, p. 603; Wagner, Schreb. Säugeth. Supp.; Rapp, Édent. p. 6.*

*Hab. Brazil; Pará (Hoffmannsegg).*

### 3. *Arctopithecus Blainvillii*.

Grey-brown, back and outside of the arm white-varied, with an elongated narrow streak extending nearly the whole length of the back. Forehead very convex and swollen over the orbits. Teeth rather large; front lower compressed.

*Arctopithecus Blainvillii, Gray, P. Z. S. 1849, p. 71, t. 11. f. 2; Turner, P. Z. S. 1851, p. 209.*

*Bradypus tridactylus brasiliensis, Blainv. Ostéogr. Brad. t. 2, 3.*

*Bradypus tridactylus, var., Peters.*

*Hab. Tropical America; Brazil.*

b. *Fur elongate, very flaccid, whitish; dorsal streak very short, indistinct, only seen where the hair is worn.*

### 4. *Arctopithecus flaccidus*.

B.M.

Pale grey-brown; back, sides of the back, and hinder part white-varied, with a short blackish dorsal streak between the shoulders. Skull with a broad rather convex forehead.

*Arctopithecus flaccidus, Gray, P. Z. S. 1849, p. 72; Turner, P. Z. S. 1851, p. 209.*

*Bradypus tridactylus, Temm.; Rapp, Édent. p. 5.*

*Aï seconde et Aï jeune, Buffon, H. N. xiii. p. 62, t. 5.*

Var. 1. *Dysonii*. Whitish grey-brown; hair of the back blackish, back with a short black streak and a white spot on each side between the shoulders. *Hab. Venezuela (Dyson).—B.M.*

Var. 2. *Smithii*. Nearly uniform whitish grey-brown; base of the hair blackish, without any dorsal streak. *Hab. Pará (J. P. G. Smith).—B.M.*

*Hab. South America.*

### 5. *Arctopithecus problematicus*.

B.M.

Fur unknown. Skull rather elongate; forehead broad, rather convex on each side over the middle of the orbit. Lower jaw with a rather broad produced angle.

*Arctopithecus problematicus, Gray, P. Z. S. 1849, p. 73, t. 11. f. 5.*

*Hab. Pará (J. P. G. Smith).*

This may be the skull of *A. flaccidus Smithii*.

BRADYPODIDA GRAVIGRADA, Owen, Burm.

See fossil genera:—1. *Megatherium*, Cuvier; 2. *Mylodon*, Owen;

3. *Lestodon*, Gervais ; 4. *Soelidothorium*, Owen (*Platyonyx*, Lund, and *Glossotherium*, Owen) ; 5. *Megalonyx*, Jefferson ; 6. *Sphenodon*, Lund ?

## Suborder II. EFFODIENTIA.

Grinders none or rootless. Canines sometimes entirely wanting ; if present, like the grinders. Face elongate ; mouth mostly small. Body armed with scales, spines, or rigid hairs. Limbs short and strong, hinder ones longest. Stomach simple ; malar bone simple or wanting.

*Dasypidæ*, Gray, *Ann. Phil.* 1825 ; *Cat. Mamm. B. M.* p. 188 ; *P. Z. S.* 1865, p. 3, f. 2.  
*Effodientia*, Baird, *N. A. Mamm.* p. 621.  
*Insektenfressende Edentaten*, Rapp, *Edent.*

The species of this family of animals have been so well described by Cuvier, Sundevall, Lund, Burmeister, and others, that I have only one or two new species to describe. I have attempted to arrange the genera, especially of the *Dasypodina*, in more natural groups.

The osteological characters have been well studied by Cuvier, De Blainville, Owen, Rapp, Turner, and others.

Figures of the skulls of a few species which have not before been published.—Gray, *P. Z. S.* 1865, p. 360–61.

Section I. *Teeth none. Body covered with scales ; revolute. Cataphracta.*—Gray, *P. Z. S.* 1865, p. 362.

## Fam. 2. MANIDIDÆ.

Body covered with scales. Tail flat, expanded. Toes bent up. Walking on the outer side of the feet. Fossorial ; slow ; forming a globe when contracted.

*Osteology.*—See Cuv. *Oss. Foss. v.* p. 99 ; Sundevall, *Kong. Vet. Akad. Hand.* 1842, p. 274 ; Turner, *P. Z. S.* 1851, p. 219.

*Manina*, Gray, *Cat. Mamm. B. M.* p. 188.

*Manidæ*, Turner, *l. c.* 1851, p. 219 ; Gray, *P. Z. S.* 1865, p. 362.

*Vermilinguia*, Giebel, *Säugeth.* p. 394.

Cuvier only knew of two species, the long- and the short-tailed *Manis* (see *Oss. Foss. v.* p. 98).



Dr. Sundevall, in the 'Kongl. Vetensk. Akad. Handlingar' for 1842, p. 245, published an excellent essay on the species, the anatomy, and the history of the genus. The essay is nearly reproduced by M. Ad. Focillon, 'Rev. Zool.' 1850, pp. 465 & 513.

Rafinesque has described a species under the name of *M. caonyx*, because he believed it had a bifid claw; but he seems to have mistaken the bone that bears the claw (which in all the species is bifid) for the claw.

### *Synopsis of the Genera.*

1. **MANIS.** Upper part of fore feet hairy, without any scales. Tail very long, slender. Scales elongate, narrow, keeled; central series of caudal scales continued to the end.
2. **PHOLIDOTUS.** Upper part of fore and hind feet covered with scales to the toes. Scales broad, short. Tail moderate, tapering; central series of caudal scales continued to the end.
3. **SMUTSIA.** Upper part of fore and hind feet covered with scales to the toes. Scales broad, short. Tail moderate, very broad to the end; central series of caudal scales not continued to the end.

### 1. MANIS.

The upper surface of the fore feet hairy, without any scales. Scales of the body slender, oblong, with nearly parallel striae. Tail much longer than the body, narrow. The central series of caudal scales continued to the end. Claws compressed; the first or outer claw of each foot very small, retracted behind. Africa.

Manis, § 1, *Sundevall*, l. c. p. 251; *Gray*, *P. Z. S.* 1865, p. 363.

The nose bald; the side of the face, chin, underside of the body, the upper surface of the hands and wrist without scales, and covered with short hair; the conch of the ear not developed.

\* *Scales of the body dark brown, in eleven series.* Manis.

#### 1. *Manis longicauda.* (Pangolin.) B.M.

Dark brown; hair of face and underside of body black. Scales of the body in eleven series; end rounded, with a central prominence. Tail very long. Body and head 11, tail 24 inches.

*Manis tetradactyla*, *Linn. S. N. i.* p. 53; *Gray*, *Cat. Mamm. B. M.* p. 188; *Turner*, *P. Z. S.* 1851, p. 220.

*Manis macroura*, *Erzl. Syst.* p. 101.

Var. ? *Manis africana*, *Desm. Mamm.* p. 376.

*Manis longicauda*, *Geoff., Sundevall*, l. c. p. 251; *Gray*, *P. Z. S.* 1865, p. 363.

*Pholidotus longicaudatus*, *Briss. R. A.* p. 31.

*Manis longicauda* β, *Sundevall*.

*Manis longicaudata*, Rapp, *Edent.* p. 15; Shaw, *Zool.* i. p. 180, t. 55.  
*Pangolin d'Afrique*, Cuv. *Oss. Foss.* v. p. 98.

*Hab.* Africa: Guinea, Gaboon.

\*\* Scales of the body horn-coloured, in twenty-one series. Phatagin.

## 2. *Manis tricuspis*. (Phatagin.)

B.M.

Pale brown; hair of face and underside of body grey; scales of the body in twenty-one series, truncated, with a central prominence, often appearing three-pointed. Body 12, tail 18 inches.

Phatagin, *Buffon*.

*Manis tricuspis*, *Rafinesque*, *Ann. Gén. Sci. Phys. de Bruxelles*, vii. p. 214; *Sundevall*, l. c. 1841, p. 252; *Gray*, *P. Z. S.* 1865, p. 363.

*Manis multiscutata*, *Gray*, *P. Z. S.* 1843; *Cat. Mamm. B. M.* p. 188; *Fraser*, *P. Z. S.* 1843; *Zool. Typ.* p. 15.

*Manis 4-dactylus*, *Thompson*, *P. Z. S.* 1834, p. 28.

*Manis tridentata*, *Focillon*, *Rev. de Zool.* 1850, t. 1.

*Hab.* West Africa: Fernando Po (*Fraser*); Guinea; Sierra Leone (*Thompson*). Skeleton and skull (B.M.).

The face of the skull, from the front of the orbit, is rather more than half the length of the brain-case.

A specimen of this species in spirits in the British Museum has the nose produced, conical, bald, smooth, with three series of plates on the front of the forehead, commencing about halfway between the tip of the nose and the eyes. The nostrils are lateral, covered with a well-developed flap. The cheeks and orbits with scattered, short, black hairs, like the hairs on the back of the hand and wrist. Ears without any external conch. The underside of the body with scattered, very short, rigid hairs. The skin of the back between the scales bald. The scales elongate, with straight sides for two-thirds of their length, then contracted, with rather concave sides, with two deep broad notches on each side of the tip, forming three more or less distinct projections, the middle one being the most produced. Soles of fore and hind feet bald and callous, covered with a hard skin, which peels off in spirits. Toes 5.5; the front inner small; the fifth, second, and then the fourth larger; the middle or third largest: hinder inner small, the outer larger; the second and fourth larger, and the third rather larger still, but not so much larger as in the front foot. The upper part of the fore feet and wrist unarmed, and covered with short, scattered hairs. The hind feet covered with scales nearly to the claws, and hairy on the sides and at the base of the claws.

Professor Rapp separates the specimens from Fernando Po as a species, because in the latter the tail is shorter and all the scales are *tricuspis*; but the specimens from West Africa vary in the length of the tail, and in perfect specimens all the scales are *tricuspis*.

In the British Museum there are a skull (fig. 42) and a complete skeleton (fig. 43) which were extracted from the skins of two animals from West Africa, which are so very much alike in form, and in the



number and form of the scales and the length of tail, that I should have referred them without doubt to the same species. The skulls,

Fig. 42.

Skull of *Manis tricuspis* (separate).

however, are so exceedingly unlike that I believe they might be considered to belong to two species, unless the differences arise from a

Fig. 43.

Skull of *Manis tricuspis* (from the skeleton).



difference of sex, which the state of the specimens does not allow me to determine.

The separate skull (fig. 42) is very ventricose, thin, light, and showing the sutures.

The skull belonging to the complete skeleton (fig. 43) is smaller, narrower, more conical, solid, and with the suture much less distinctly visible.

A fœtus of this species, 10 inches long, was noticed by Mr. Thompson under the name of *M. tetradactylus* (Proc. Zool. Soc. 1834, p. 28).

## 2. PHOLIDOTUS.

The fore and hind feet entirely covered with keeled scales; the internal claw of the fore foot nearly equal to the outer one, and not retracted behind. Scales of the body broad, short. Tail moderate, tapering at the end; the central series of caudal scales continued to the tip. *Hab.* India and Asiatic Islands.

*Pholidotus*, Gray, *P. Z. S.* 1865, p. 365.

*Manis* β. *Pholidotus*, Sundevall, *l. c.* p. 253; *Rapp, Edent. t. 6. f. 1, 2.*

\* Scales dark brown, in seventeen longitudinal series; the three or four series on each side shorter, keeled. Tail as long as body and head. Face of skull elongate, nearly as long as brain-case.

### 1. *Pholidotus javanus*.

B.M.

Dark brown; tail as long as body and head; scales of the sides and of the hind feet acutely keeled, the front and hinder claws nearly equal-sized. Head and body 15, tail 15 inches.

*Manis pentadactyla*, *Raffles, Linn. Trans.* xiii. p. 249.

*Manis javanica* (partly), *Fischer, Syn.* p. 400 (not of Sundevall).

*Manis aspera*, Sundevall, *l. c.* p. 253; *Rapp, Edent. t. 2 a* (good), t. 6. f. 1, 2 (skull); *Desm. Mamm.* p. 377; *Gerrard, Cat. Bones B. M.* p. 285.

*Pholidotus javanus*, Gray, *P. Z. S.* 1865, p. 366.

*Hab.* Sumatra (*Raffles*). Male and female (B.M.).

Teats two, pectoral; penis pendent.

*Manis aspera* is described from a single specimen in the Paris Museum, sent from Sumatra. It is evidently the same as that which *Raffles* described and figured under the name *M. javanica*, and which has been so named in the English museums.

The *M. javanica* of Dr. Sundevall, which he described as having fulvous scales, is the same as his *M. Dalmanni* and the *M. aurita* of Hodgson, which is common in India and has been generally confounded with the larger-scaled *M. pentadactyla* or *M. laticauda*.

Desmarest describes, under the name of *M. javanica*, the Java animal with keeled scales on the legs, and refers to *Raffles*.

*Manis guy*, Focillon, *Rev. Zool.* 1850, t. 10; *Rapp, Edent.* 17.

"Tail shorter than the body and head; twenty-one longitudinal rows of scales; end of the tail naked on its lower surface; scales broad, ending in an obtuse point, striated to the tip; with bristles between the scales."

Described and figured from a young specimen preserved in spirit, said to have been received from Africa. Appears to me to be only a young specimen of *Pholidotus javanicus*.

The front feet are covered with scales to the claws, and it has the ear-conch moderately developed, not so much so as in *P. Dalmanni*.

What is *Manis leucura*, Blyth, Journ. Asiat. Soc. Beng. xxx. p. 91; Rapp, Edent. p. 18, thus described, "Tail as long as the body and head; scales of the tail adpressed, so that the margin is entire, not dentated"? The habitat is unknown.

*Manis javanica*, Motley & Dillwyn, N. H. Labuan, p. 51. Body with 15 rows of scales; tail with 29 marginal scales.

"*Pengoling* signifies an animal rolling itself up, which the *Manis* occasionally does, presenting only its impenetrable scales. It inhabits hollow trees, feeds on ants alone, of which its stomach contains thousands. It is a slow-moving animal, but very strong, and by means of its powerful prehensile tail (which is furnished with a little naked callosity) climbs tolerably well among rocks and dead trees. The tongue is exceedingly long, round, and fleshy, and is used to obtain its food by being laid across the tracks of ants, which stick to a glutinous secretion with which it is provided." Its favourite prey is said to be a black species of *Termites*.

\*\* Scales horn-coloured; of the back, in seventeen longitudinal series. Tail as long as the body. Conch of ear produced.

## 2. *Pholidotus Dalmanni*.

Pale brown; tail short, as long as the body without the head; scales of the young striated, of the middle of back truncated, of the sides of hind feet keeled; of the older specimen worn smooth; ears large; hair of head and underside of body short, grey. Body and head 22, tail 15 inches.

*Manis*, *Dalmann*, *Act. Stockh.* 1749, p. 265, t. 6.

*Manis*, *Förster*, *Act. Berol.* 1789 (printed 1793), p. 90, t. 5, 6; *Sundevall*, *l. c.* pp. 262, 269.

*Manis Dalmannii*, *Sundevall*, *l. c.* p. 256, t. 4 a. f. 10 (toe-bones), 1842; *Rapp*, *Edent.* p. 17.

*Pholidotus Dalmannii*, *Gray*, *P. Z. S.* 1865, p. 366.

*Manis aurita*, *Hodgson*.

*Manis pentadactyla* (partly), *Gerrard*, *Cat. Bones B. M.* p. 285.

*Manis javanica*, *Sundevall*, *l. c.* p. 254, t. 4 a. f. 11; *Turner*, *P. Z. S.* 1851, p. 219?

*Pangolin*, *Buffon*, x. t. 34.

*Hab.* India, Himalaya (*Hodgson*); China (*Dalmann*); ? Java (*Sundevall*).

A small specimen of the species, preserved in spirit in the British



Museum, may be thus described:—The head ovate, convex above and on the sides. The end of the nose, the side of the face, including the orbit, to the back of the ears, the throat, underside of the body, and the inside of the legs bald, with a few very slender, elongated hairs on the front of the chin. The forehead with one scale, and five series of scales behind it. The ears large, with a well-developed, oblong, nearly flat conch behind; an oblong prominence for a tragus in front of the small auditory aperture. The fore and hind legs covered with series of scales down to the base of the toes; the toes united to the claws. The palms of the fore feet and the soles of the hind feet hard, callous, well developed. The fore feet with five elongated conical claws, which are strongly inflexed on both palms; the inner and outer small, then the second and fourth, and the centre or third the largest. The hind feet with five short, conical, compressed claws; the inner and outer small, the three middle larger, the middle one being rather the largest. The skin of the back, between the bases of the scales, bald; the lower part of the scales and the middle of the scales striated. The tongue elongate, exsertile, flat, linear, tapering to the tip, which is rounded. The eyelids soft, distinct, not ciliated, but the outer surface entirely covered with very short bristles.

Professor Sundevall, in his Monograph, places considerable reliance on the form of the claws, and on the comparative size and form of the claws of the fore and hind feet, as a specific distinction. The specimens which I have examined from the same locality seem to differ very much in this respect.

*Manis Dalmannii* was described from specimens from China, which looked like the young of *M. laticauda*. It is probably the same as the many-scaled species from India, or at least must be very nearly allied to it, more especially as the large size of the ears, which caused Hodgson to call it *M. aurita*, is mentioned.

Dr. Sundevall states that his *M. javanica* is from Java, and he believes that it is common there; but he describes all the scales as fulvescent. I have never seen any Javan or Sumatran specimen of that colour. They are always dark brown, while the Indian species is always pale-coloured; and I am inclined to believe that it must have been the Indian species that was described.

There are two skulls of this species in the British Museum, received from Mr. Hodgson as belonging to his *M. aurita*; they are very solid, considerably stouter in proportion to their length than the skull of *M. indica* figured by Cuvier, and they have very broad nasal bones, which are rounded at the hinder end.

Professor Sundevall believes that the skeleton of *Pangolin à courte queue*, or, as he quotes it, "*Pangolin des Indes*," figured and described by Cuvier in the 'Ossemens Fossiles,' is the skeleton of his *M. javanica*. I think this a mistake. Compare the skull with the skull of *M. javanica* figured by Rapp, which I am assured was taken out of the skin which he figures (which is the true *M. javanica* of this essay). I believe that the *M. javanica* of Sundevall is an Indian and not a Javan species; and it differs from the Indian species



figured by Cuvier in the skull being shorter and broader, as mentioned above.

\*\*\* Scales horn-coloured, pale; of the back, in eleven or thirteen longitudinal series. Tail as long as the body. Ears with only a slightly raised edge, without any distinct conch. Phatages.

### 3. *Pholidotus indicus*.

Pale brown; scales striated at the base; tail more slender than the body, tapering to the end, as long as the body without the head; ears not prominent.

"Varies in the width of the tail and the curvature of the claw."—*Sundevall*.

*Manis pentadactyla*, *Linn. S. N.* i. p. 51; *Gerrard, Cat. Bones B. M.* p. 285 (partly); *Gray, List Mam. B. M.* p. 188; *Turner, P. Z. S.* 1851, p. 219.

*Manis laticauda*, *Illiger; Sundevall, l. c.* p. 259.

*Manis macroura*, *Desm. Mamm.* p. 376.

*Manis brevicaudata*, *Tiedem. Zool.* i. p. 497.

*Manis brachyura*, *Erzl. Syst.* p. 98.

*Manis crassicaudata*, *Gray in Griff. A. K.; Rapp, Edent.* p. 16.

*Pholidotus indicus*, *Gray, P. Z. S.* 1865, p. 368.

Broad-tailed *Manis*, *Penn.*

*Pangolin à courte queue*, *Cuv. Oss. Foss.* v. t. 8 (skeleton).

*Hab.* Asia—India: Bengal, Madras, Pondicherry, Assam.

The skull in Cuvier's figures (*Oss. Foss.* v. t. 8. f. 2-4) is much more slender and less ventricose behind than the skulls of *M. Dalmannii* in the British Museum. The face is represented as being about two-fifths the entire length of the head; and the nasal bones are narrower and longer.

In a fetus in spirit in the British Museum, the eyelids are soft, the ears are only fringed with a slightly raised edge, and there are a few bristles projecting between the scales of the back.

Mr. MacClelland describes the *Manis brachyura* of Assam as having fifteen longitudinal series of scales, with bristles in pairs passing out between the scales. The lower part of the head and body and inside of the legs covered with coarse white hairs (*Proc. Zool. Soc.* 1839, p. 153). Is this *M. Dalmannii*?

### 4. *Pholidotus giganteus*. (Ipi.)

B.M.

Pale brown; scales striated at the base; tail as long as the body, tapering to the end. Body and head 30, tail 25 inches.

*Manis gigantea*, *Illiger, Akad. Berl.* 1811, pp. 78, 84, 1815.

*Pholidotus africanus*, *Gray, P. Z. S.* 1865, p. 368, t. 17.

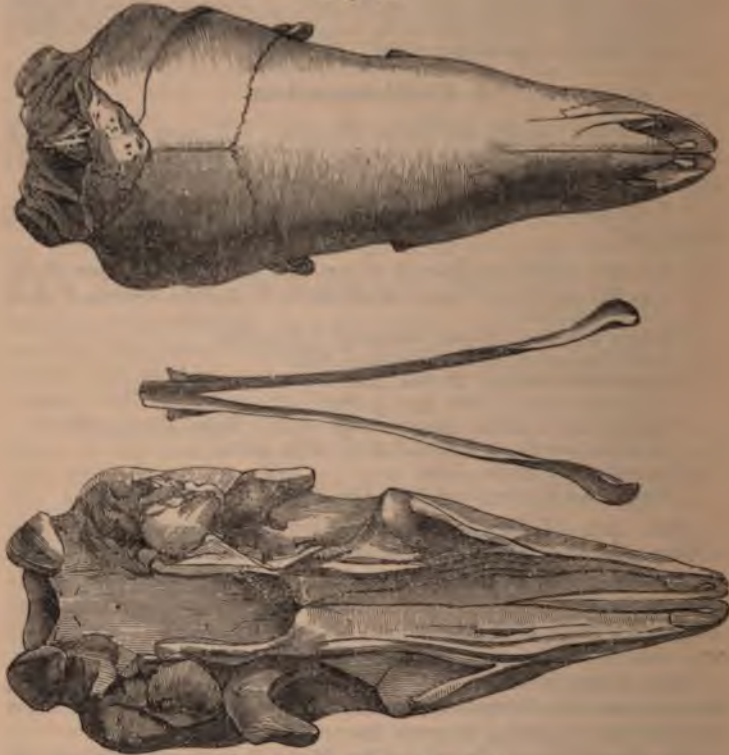
Ipi (*Pholidotus africanus*), *Du Chaillu, Jour. Ashangoland*, p. 43, t.

*Hab.* West Africa, River Niger (*Dr. B. Baikie*); Guinea (*Illiger*); *Fernand, Vaz (Du Chaillu)*; *Cape-Coast Castle (B.M.)*.

Very like *P. indicus*; but the scales are larger, and the tail is

longer. Illiger says *M. gigantea* from Guinea is like *M. brachyura*, but 4 feet long. The Museum specimen from Cape-Coast Castle is upwards of 5 feet long.

Fig. 44.

Skull of *Pholidotus giganteus*.

Du Chaillu sent to the British Museum two specimens of *Manis longicauda* and one of *Pholidotus giganteus*, all under the name of the "Ant-eater," evidently regarding them as one species.

Which is the species called *Ipi*, or is it common to both?

What is *Manis leptura* (Blyth, Journ. Asiat. Soc. of Bengal, xvi., Arch. f. Naturg. 1849; Rapp, Edent. p. 18)?

### 3. SMUTSIA.

Upper part of the fore and hind feet covered with scales. Scales broad, short, and pale-coloured. Tail very broad, rounded at the end; central series of scales interrupted before reaching the end of the tail.

*Smutsia*, Gray, *P. Z. S.* 1865, p. 369.

**Smutsia Temminckii.**

Scales striated, elongate; of the middle series only on the base of the tail.

*Manis Temminckii*, *Smuts, Mamm. Cap.* p. 54; *Smith, Ill. S. Afr. Zool.* t. 7 (scales bad); *Bennett, P. Z. S.* 1834, p. 81; *Turner, P. Z. S.* 1851, p. 219; *Gerrard, Cat. Bones, B. M.* p. 285; *Sundevall, l. c.* p. 260, t. 4. f. 2 (young skull and toe-bones); *Peters, Reise n. Mossamb.* i. p. 174, t. 32. f. 8 (os hyoides); *Rapp, Edent.* p. 17; *Rüpp. Mus. Senck.* iii. p. 179.

*Smutsia Temminckii*, *Gray, P. Z. S.* 1865, p. 369.

*Hab.* Eastern Africa, Sennaar, Caffraria, Kordofan (*Hedenborg*), Latakoo (*Steedman*).

Sundevall figures the skull of a very young specimen of this species. It is short, ventricose; the face broad, short, not half the length of the brain-case; the nasal bones are short, broad, wide behind; the lower jaw simple, without any process in the front of the upper edge (see *Vet. Akad. Hand.* 1842, t. 4. f. 34).

Section II. *Body covered with a bony convolute armour, formed of imbedded tesserae placed in transverse rings.*

*Dasypus*, *Linn., Cuvier.*

*Dasipina*, *Gray, Mamm. B. M.* p. 189.

*Dasypodidae*, *Turner, P. Z. S.* 1851, p. 211; *Gray, P. Z. S.* 1865, p. 370.

*Fodientia*, *Illiger; Burmeister, Thiere Bras.* p. 208; *Giebel, Säugeth.* p. 417.

*Loricata*, *Vicq-d'Azyr.*

*Osteology.*—See *Cuv. Oss. Foss.*; *Turner, P. Z. S.* 1851, p. 211.

*Cuvier* (*Oss. Foss.* v. p. 117. 1) divides the Armadillos into three groups according to the number of the toes:—

- I. Hind feet with four claws, the two central equal: *Dasypus novemcinctus*, *Linn.* = *Tatusia*; *D. tricinctus*, *Linn.* = *Tolypeutes*.
- II. The hind feet with five claws, one of the middle ones larger: *D. sexcinctus* = *Dasypus*; *Tatou pichey* and *Tatou velu* = *Euphractus*.
- III. The hind feet with five claws, the three outer ones very large: *D. unicinctus* = *Xenurus*; *Tatou géant* = *Prionodos*.

*Cuvier* observes, "The Armadillos with four toes have a short penis with a large three-lobed gland, and those with five toes a very long penis." The *Apar* (*D. tricinctus*), which is arranged with those having four claws, has five claws, and has a penis like those of that division.

These animals walk in three different manners, each having a particular conformation of the foot for the purpose.

The *Tatusiae* are digitigrade.

The *Dasypodes* are plantigrade.

The *Tolypeutes* walk on the tips of the front claws, and may be called unguligrade.



The differences in the form of the bones of the feet are described and figured in Cuvier's 'Oss. Foss. ;' but he does not appear to have been aware of the differences in the habit and mode of walking.

Dr. Burmeister, in 'System. Uebers. der Thiere Brasiliens,' p. 276, 1854, divides the genus *Dasypus* of Linné into two subgenera—*Dasypus* and *Praopus*—the latter for *D. 9-cinctus* of Linnæus, and synonymous with the genus *Dasypus* as restricted by Wagler.

### Fam. 3. DASYPODIDÆ.

The dorsal disk closely attached to the back of the animal, divided in the middle by free rings into scapular and pelvic shields; pelvic shield free from the pelvis. Scapular and pelvic shields moderate; central rings several. Feet strong; hind toes free; claws large. Skull smooth above, and separate from the frontal shield. Tail elongate. *Peltochlamydes*.—Gray, P. Z. S. 1865, p. 371.

Dasypodina, Gray, P. Z. S. 1865, p. 371.

See development of teeth, Flower, P. Z. S. 1868, p. 378, and Gervais, Hist. Mam. ii. p. 252, fig.

#### *Synopsis of the Genera.*

A. Digitigrade. *Backs of feet round, covered with plates; toes of the front and hind feet separate; claws conical. Head elongate; ears close together. Cherochlamydes.*

1. TATUSIA. Toes 5.4. Tail with rings of plates.

B. Plantigrade. *Soles of feet flat, callous, with a prominent heel; toes of fore feet united to the claws, compressed; claws compressed, sharp-edged below. Toes of hind feet separate; claws elongate. Head broad; ears far apart. Platychlamydes.*

\* *Head conical. Teeth many, small.*

2. PRIONODOS. Toes 5.5; middle front very large; outer front toes very small. Intermaxillary toothless. Four front bands of tesserae of the scapular shield partially free.

\*\* *Head flat, conical. Teeth few, nine or ten, large; intermaxillary with one tooth on each side.*

3. DASYPUS. Tail round at the base, tesserae convex. Marginal plates of the dorsal disk small; nuchal band linear, broad to the end; first band of plates of the scapular shield fixed like the rest.

\*\*\* *Head broad, conical. Teeth few, nine or ten, large; intermaxillary toothless.*

4. EUPHRACTUS. Tail ringed at the base; tesserae convex. Marginal plates of the dorsal disk falcate; nuchal band narrow at the sides; first band of the scapular disk more or less free.

5. XENURUS. Tail rather naked, with sunken shields.

A. Digitigrade. *The toes of the front and hind feet separate; claws conical, similar; palms and soles covered with shields, without any marked heel. Head elongate, ovate; forehead rounded; nose slender; ears close together, on the top of the head. Body subcylindrical. Choerichlamydes.*

These animals walk on their toes, and are very porcine in their character, as well as in the general form of the feet; the hinder part of the wrist and feet is covered with plates like the rest of the legs.

### 1. TATUSIA.

Central rings 5 to 8. Toes 4, 5, subequal, the two front and three hinder middle largest; inner and outer small; claws conical. Tail conical, elongate, annulated; lower rings of two or three series of plates. Cutting-teeth none; grinders 8, 8, moderate. The penis short, ending in a three-lobed gland (*Cuvier*, v. p. 118).

*Osteology*.—See *Cuvier*, *Oss. Foss.* v. t. 10; *Turner*, *P. Z. S.* 1851, p. 212.

*Tatus*, *Gesner*.

*Tatusia*, sp., *F. Cuvier*; *Gray*, *P. Z. S.* 1865, p. 371.

*Dasypus*, *Wagler*.

*Dasypus* 2 (*Tatusia*), *Rapp*, *Edent.* p. 8.

*Praopus*, *Burmeister*, *Syst. Ueber. d. Thiere Brasil*, i. p. 295, 1854; *Arch. f. Naturg.* 1862, p. 98.

\* *Face suddenly contracted; the nose subcylindrical; hinder part of palate rather narrow, flat, rounded on the sides. Tatusia.*

### 1. *Tatusia peba*.

Ears one-third of the length of the head; shields smooth; under-side with scattered bristles; tail as long as the body.

*Tatusia septemcincta*, *Gray*, *Cat. Mamm. B. M.* p. 189; *Gerrard*, *Cat. Bones B. M.* p. 286; *Turner*, *P. Z. S.* 1851, p. 212.

*Dasypus septemcinctus*, *Linn. Am. Acad.* i. p. 281.

*Dasypus octocinctus*, *Schreb. Säugeth.* t. 73.

*Dasypus novemcinctus*, *Linn. S. N. i.* p. 54.

*Dasypus niger*, *Illiger*.

*Dasypus longicaudus*, *P. M. Abbild.* t. 83?

*Tatusia affinis*, *Lund*.

*Dasypus peba*, *Desm. Mamm.* p. 368; *Owen*, *P. Z. S.* 1831, p. 141; *Krauss*, *Arch. für Naturg.* 1862, p. 20, t. 3, f. (skull).

*Praopus 7-cinctus*, *Burmeister*, *La Plata*, p. 428.

*Tatusia peba*, *Owen*, *Odont.* t. 82, f. 2; *Gray*, *P. Z. S.* 1865, p. 372.

*Dasypus tatusia peba*, *Lesson*; *Rapp*, *Edent.* p. 8.

*Praopus longicaudatus*, *Burm. Thier. Bras.* p. 298, 1854; *Abhandl. Nat. Ges. zu Halle*, 1861, p. 147.

*Tatou noir*, *Azara*; *Cuvier*, *Oss. Foss.* v. t. 10 (skeleton).

*Cachicame*, *Buffon*, *H. N. x.* p. 215, t. 57; *Cuv. Oss. Foss.* v. p. 124, t. 10 (shield).

? *Tatouële*, *Buffon*, *H. N. x.* p. 212.

*Hab.* Central and South America: Texas (*Baird*); Guiana (*Krauss*); Brazil (*Pr. Max.*); Paraguay (*Azara*).



"Texan Armadillo. The people of Matamoras esteem its flesh, and the women attribute imaginary properties to its shell. Living on the kitchen-refuse. Nocturnal; burying flesh and vegetable substances for food."—Baird.

The head of the animal and the skulls in the Museum collection seem to increase in width, compared to the length, as the animal increases in age. The width of the head and skull does not depend on the sex; for we have broad-headed and narrow-headed males in the collection. The sides of the stuffed specimens are pale whitish, with black backs. The specimens vary in the size of the scapular disk. In one male in the Museum it appears much smaller than in most of the other specimens; but they all vary more or less in this character. The tail varies considerably in length, compared with the length of the body; but the shortest is as long as the body.

See *a. Tatou verdadeiro*, Cuv. Oss. Foss. v. p. 118; Turner, P. Z. S. 1851, p. 213. *Dasypos uroceras*, Lund, Dansk. Vedensk. Natur. Afh. viii. pp. 65, 225; Rapp, Edent. p. 8. *Hab. Brazil (M. de St.-Hilaire)*. Tail terminated by a horny sheath of one piece, the bands broader; plates of pelvic shield larger.

There is no specimen agreeing with the above description. May not the peculiarity of the tail be an accidental malformation?

Dr. Burmeister gives *Tatu verdadeiro* as one of the common Brazilian names of the species; and he gives *D. uroceras* as a synonym of his *D. (Praopus) longicaudatus*.

Dr. Peters, in the 'Monatsberichte' for 1864, p. 179, very shortly indicates, but gives no diagnostic characters nor descriptions of, *Dasypos pentadactylus*, *D. fenestratus*, and *D. novemcinctus*, var. *mexicanus*. The latter is probably the animal described by Dr. Spencer Baird. It is to be regretted that every zoologist who wishes to name a species does not append to it a diagnosis: in this respect the Scandinavian zoologists of Sweden and Denmark set a good example.

## 2. *Tatusia hirsuta*.

Tail elongate, tapering; the head, body, limbs, and dorsal shield covered with elongated hairs; the head elongate; nose slender; ears large.

*Praopus hirsutus*, Burm. Abhandl. Nat. Ges. Halle, 1861, p. 147; *Reise durch d. La Plata Staaten*, 1861, p. 228; Arch. f. Naturg. 1862, p. 144.

*Tatusia hirsuta*, Gray, P. Z. S. 1865, p. 373.

*Dasypos hispidus*, Burm. La Plata, ii. p. 428.

*Hab. Guayaquil (Mus. Lima, Burmeister)*.

Length of head  $4\frac{1}{2}$ , body  $11\frac{1}{4}$ , and tail  $10\frac{1}{2}$  inches. The rings and the plates of the shield are very indistinctly marked, indeed only shown at the shoulders and by slight folds on the lower part of the sides.

See *Dasypos hispidus*, Burm. Thiere Brasiliens, i. p. 287. *Hab. Brazil*; said to be distinct from *D. hirsutus*, Burm.



3. *Tatusia hybrida*.

Ears above one-fourth the length of the head ; plates of the pelvic shield convex and elevated ; tail about half or one-third the length of the body.

*Dasypus hybridus*, *Desm. Mamm.* p. 368 ; *Martin, P. Z. S.* 1837, p. 13 (anat.) ; *Darwin, Voy. Beagle*, i. p. 92.

*Tatusia hybrida*, *Less. Mamm.* p. 311 ; *Turner, P. Z. S.* 1851, p. 213 ; *Gray, P. Z. S.* 1865, p. 373.

*Dasypus (Tatusia) hybridus*, *Rapp, Edent.* p. 9.

*Dasypus septemcinctus*, *Schreb. Säugeth.* ii. p. 220, t. 72 & 76.

*Dasypus (Praopus) hybridus*, *Burm. La Plata*, p. 428.

Tatou mulet, *Azara*.

*Hab.* Paraguay, very common ; Rio Negro ; North Patagonia.

\*\* *Face attenuated ; nose elongate, conical ; hinder part of the palate broad, concave, with raised edges on the side. Praopus.*

4. *Tatusia Kappleri*.

*Dasypus Kappleri*, *Krauss, Arch. für Naturg.* 1862, p. 24, t. 3. f. 1, 2 (skull).

*Dasypus (Praopus) peba*, *Burm.*

*Tatusia Kappleri*, *Gray, P. Z. S.* 1865, p. 373.

*Hab.* Surinam (*Krauss*).

Carapace very much like *Tatusia peba* ; but there are two series of claw-like plates, with free projecting ends, on the anterior side of the lower part of the hind legs ; there are five plates in the upper series. The skull is large, and nose much more produced ; the palate keeled on the sides in a line with the zygomatic arch.

In *D. peba* (*l. c.* t. 3. f. 3, 4) the palate is rounded on the sides, without any keel, and the nose shorter and more slender. Neither of the four skulls in the British Museum is near as large as the one figured by Dr. Krauss ; but some of them have the palate keeled on the sides, more as in his figure of *T. Kappleri* than as the palate is represented in the one he calls *T. peba*.

See *Dasypus punctatus*, *Lund* ; *Tatusia*, sp., *Turner, P. Z. S.* 1851, p. 313. Defined from a denuded skin in Mus. Coll. Surg.

B. Plantigrade. *Palms and soles bald, callous, with a prominent heel. The toes of the fore feet united to the claws, compressed ; claws compressed, sharp-edged beneath. Toes of hind feet separate ; claws elongate, acute. Head broad ; forehead flattened ; nose short ; ears far apart, on sides of the head. Body depressed. Platychlamydes.*

The body is depressed, expanded, more or less covered with hair, which sometimes almost hides the tesserae of the shield. Legs short, strong ; the whole of the feet applied to the ground in walking.

- A. *Head ovate; forehead convex; teeth numerous, small; intermaxillaries toothless. The first three or four rings of tesserae of the scapular rings partially free. Tail not ringed. The soles of the hind feet with tesserae on the sides and behind.*

## 2. PRIONODOS.

The three or four front rings of the scapular shield deeply divided, free when young; central rings numerous. Tail not ringed, with the tesserae placed alternately. Plantigrade; soles of the feet partially covered with tesserae. Toes 5.5; two inner front toes small; outer very small, rudimentary; third and fourth large; the third very large, with a very large claw. Skull broad; nose broad. Teeth  $\frac{3}{4}$ .  $\frac{3}{4}$ , small; intermaxillary toothless.

*Osteology*.—See Turner, P. Z. S. 1851, p. 215; Cuv. Oss. Foss. v. t. 11. f. 1, 3; Rapp, Edent. t. 11.

Prionodontes, F. Cuv.; *Less. Mam.* p. 309; Turner, P. Z. S. 1851.

Prionodonta, Gray, *Cat. Mamm. B. M.*

Dasypus (Prionodontes), Rapp, *Edent.* p. 10.

Cheloniscus, Wagler; Krauss.

Prionodos, Gray, P. Z. S. 1865, p. 374.

The skeleton is figured by Rapp, *Edent.* t. 4 b. f. 1. The two inner toes of the fore feet elongate, slender, with small claws; the three others short; the third very stout, with a very large claw; the fourth similar, but smaller; the fifth or outer very small and short. The pelvis very broad behind; the second cervical vertebra elongate, with a very high superior central crest, and very rudimentary lateral processes.

### Prionodon gigas. (Tatou.)

B.M.

Dasypus gigas, Cuv. Oss. Foss. v. p. 128, t. 11. f. 1, 5; Pr. Max. Beitr. ii. p. 516; *Burm. Brasil.* p. 277.

Dasypus giganteus, *Desm. Mamm.* p. 368.

Prionodonta gigas, Gray, *Cat. Mamm. B. M.* p. 120; Owen, *Odont.* t. 85.

f. 1; Gerrard, *Cat. Bones B. M.* p. 287.

Prionodontes gigas, Turner, l. c.; Gervais, *Expéd. de F. L. de Castelnau, Mamm.* t. 18; Rapp, *Edent.* t. 4 b (skeleton).

Prionodos gigas, Gray, P. Z. S. 1865, p. 374.

Prionodontes giganteus, *Less. Mamm.* p. 309.

Cheloniscus gigas, Wagler; Krauss, *Arch. f. Naturg.* 1862, p. 19.

Kabalassou, *Buffon, H. N. x.* t. 41.

El Maximo, Azara.

*Hab.* Paraguay (Azara); Surinam (Krauss); Brazil (called "Tatu canastra").

- B. *Head flat, conical. Teeth few, nine or ten, large; intermaxillary bone with a tooth on each side behind. Tail shielded.*

## 3. DASYPUS.

Head broad, covered with large plates; a series of small shields under the eyes; frontal plate large, broad. Central rings six or eight.

Two short bands of large equal plates, not so wide as the head, between the back of the head and the front edge of the scapular shields. Toes 5.5. Teeth  $\frac{9}{10}$  .  $\frac{9}{10}$ ; the first upper in the inter-maxillary.

Encoubert, *Buffon*; *Cuv. Oss. Foss.* v.; *Rapp*, t. 3. f. 4, 5.

*Dasypus*, *Turner*, *P. Z. S.* 1851, p. 214; *Gray*, *P. Z. S.* 1865, p. 375.

*Dasypus* (*Euphractus*), *Burmeister*, *La Plata*, ii. 1861.

*Euphractus*, *Wagl.*

*Dasypus* (1. *Dasypus*), *Rapp*, *Edent.* p. 7 (skull t.).

\* *Dorsal shield with two short hairs on the hinder margin of each tessera; underpart of the body with scattered bristles.*

#### 1. *Dasypus sexcinctus*.

B.M.

Dorsal shield bald, with two hairs on the hinder side of each of the dorsal tesserae.

*Dasypus sexcinctus*, *Linn. S. N.* p. 154; *Cuv. Oss. Foss.* v. t. 11. f. 456; *Gerrard*, *Cat. Bones B. M.* p. 286; *Burm. Thier. Bras.* p. 290; *Owen*, *Odont.* t. 85. f. 3, 4; *Gray*, *Cat. Mamm. B. M.* p. 189; *P. Z. S.* 1865, p. 375; *Turner*, *P. Z. S.* 1851, p. 214; *Rapp*, *Edent.* p. 7, t. 3. f. 4, 5 (skull).

*Dasypus encoubert*, *Desm. Mamm.* p. 370.

*Dasypus setosus*, *P. Mar.* ii. p. 520; *Abh. Bras.* t.

*Encoubert*, *Cuv. Oss. Foss.* v. t. 11. f. 4-6 (skull).

*Dasypus villosus*, *Giebel*, *Zeitschrift*, 1861, p. 93, t. 345. f. 1 (skull).

*Dasypus gilvipes*, *Illiger*, *Abh. Berl. Akad.*

*Dasypus octodecim-cinctus*, *Erzl.*

*Hab.* Brazil and Paraguay.

One of the young specimens in the British Museum has only four toes on the hind feet; but the outer toe on one foot appears to have been destroyed, and on the other foot there is a scale where the fifth ought to be placed. This may be the normal state of a different species.

The skull which Giebel figures as that of *D. villosus*, Burmeister, evidently belongs to this species.

\*\* *Dorsal shield with numerous elongated bristles from the hinder edge of each tessera; underpart of body very hairy.*

#### 2. *Dasypus vellerosus*, sp. nov.

B.M.

The forehead convex, with many polygonal shields; the dorsal shield covered with abundant elongated bristly hairs; the underside of the body covered with close hairs. Toes 5.5, the outer and inner hinder small.

*Dasypus vellerosus*, *Gray*, *P. Z. S.* 1865, p. 376, t. 18.

*Hab.* Santa Cruz de la Sierra (*Bridges*).



c. *Head broad, depressed; nose very slender, broad, depressed; intermaxillary toothless.*

#### 4. EUPHRACTUS.

Head conical, covered with a shield of very many polygonal plates, with a tuft of hair under the eyes. Nape with a narrow short band of small plates. Dorsal disk very hairy, the first row of plates on the front of the scapular shield forming a free ring; the lower marginal plates of the pelvic shield large, falcate. Tail conical, covered with rings of plates. Toes 5.5; claws acute, triangular, front largest. Skull broad, very depressed. Nose very slender, elongate; intermaxillary bone toothless. Teeth  $\frac{3}{3}$ , moderate.—*Gray, P. Z. S. 1865, p. 376.*

*Dasypus* (*Euphractus*), partly, *Burmeister.*

*Euphractus*, partly, *Wagler.*

*Dasypus*, sp., *Turner, P. Z. S. 1851, p. 214.*

*Tatusia*, sp., *Burmeister.*

\* *Nose short, broad; ears long.*

#### 1. *Euphractus villosus.* (Peludo.)

B.M.

Muzzle broad; ears large; forehead broad, covered with rugulose tubercular plates; back covered with abundant long black hairs, more or less deciduous.

*Dasypus villosus, Desm. Mamm. p. 370; Gerrard, Cat. Bones Mamm. p. 286; Turner, P. Z. S. 1851, p. 214.*

*Tatusia villosa, Lesson, Mam. p. 312.*

*Dasypus* (*Tatusia*) *villosus, Rapp, Edent. p. 10.*

*Dasypus* (*Euphractus*) *villosus, Burmeister, La Plata, ii. 1861.*

*Euphractus villosus, Gray, P. Z. S. 1865, p. 376.*

*El Peludo, Azara, ii. p. 140.*

*Hab.* Buenos Ayres, Pampas.

The skull which Giebel (*Zeitschrift*, 1861, t. 345. f. 1) figures under the name of *D. villosus* is evidently that of *D. sexcinctus*.

\*\* *Nose slender, elongate; ears small.*

#### 2. *Euphractus minutus.* (Pichy.)

B.M.

Nose slender, elongate; ears small; forehead convex, covered with irregular smooth polygonal plates. Back with scattered elongate, slender, black or grey bristles.

*Dasypus minutus, Desm. Mamm. p. 371; Turner, P. Z. S. 1851, p. 214.*

*Dasypus patagonicus, Desm. N. Dict. H. N. xxx. 11. p. 491.*

*Tatusia minuta, Lesson, Mam. p. 847; Gray, List Mamm. B. M. p. 190; Gerrard, Cat. Bones B. M. p. 286.*

*Dasypus* (*Euphractus*) *minutus, Burmeister, La Plata, ii. p. 427, 1861.*

*Dasypus* (*Tatusia*) *minuta, Rapp, Edent. p. 10.*

*Euphractus minutus*, Gray, P. Z. S. 1865, p. 377, fig. (skull).  
Tatou pichey, Azara.

Hab. Chili; La Plata.

Fig. 45.



Skull of *Euphractus minutus*.

"The four Chilian species of Armadillo (*Dasypus*) are nearly similar in habits. The Peludo (*D. villosus*) is nocturnal; while the others wander by day over the open plains, feeding on beetles, larvæ, roots, and even small snakes. The Pichy (*D. minutus*) prefers a very dry soil and the sandy dunes near the coast, where for many months it can never taste water. In soft soil the animal burrows so quickly that its hinder quarters would almost disappear before one could alight from one's horse."—*Darwin's Journ.* p. 96.

##### 5. XENURUS.

Head elongate. Scapular and pelvic shields convex; central rings many, ten or eleven. Toes 5, 5. Tail nakedish, with a few imbedded tesserae. Teeth  $\frac{8}{6} . \frac{8}{6}$ ; intermaxillary teeth none. Skull elongate; brain-case constricted over the back of the orbit, swollen in front; forehead convex; nose conical, truncated.—Gray, P. Z. S. 1865, p. 377.

The plates on the inner side of the two inner toes of the fore and hind feet are ciliated with a series of bristle-like hairs.

Cabassou, *Buffon*; Cuv. *Oss. Foss.* v. t. 11. f. 7, 9.

Xenurus, *Wagler*; *Turner*, P. Z. S. 1851, p. 215; *Krauss*; Gray.

\* *Nose of skull elongate, produced.* Tatoua.

1. *Xenurus uncinatus.* (Kabassu.) B.M.

Tail nakedish, with some scattered shields; those of the base of the tail immersed; becoming more abundant, closer, and more developed at the end, especially on the underside of the tip.

*Dasypus uncinatus*, Linn. S. N. i. p. 52.

*Dasypus gymnurus*, Illiger; P. Max. Beitr. ii. p. 529.

*Dasypus tatouay*, Desm. Mamm. p. 369; Tschudi, Faun. Peru, p. 206;

Guérin, Icon. Mamm. t. 34. f. 2.

*Dasypus duodecim-cinctus*, Schreb. Säugeth. p. 225, t. 75, 76.

*Tatusia tatouay*, Lesson, Mam. p. 311.

*Dasypus multicincta*, Thunb. Vet. Akad. Hand. 1818, p. 68, t. 1.

*Xenurus uncinatus*, Gray, Cat. Mamm. B. M. p. 120; P. Z. S. 1863, p. 378; Turner, P. Z. S. 1851, p. 215; Gerrard, Cat. Bones B. M. p. 285.

*Dasypus xenurus* et *D. 12-cinctus*, Krauss, Arch. f. Nat. 1862, p. 19.

*Tatusia gymnura*, Rapp, Edent. p. 9.

Cabassou, Cuv. Oss. Foss. v. p. 120, t. 11. f. 7-9 (skull).

Kabassou, Buff. H. N. x. p. 218, t. 40.

Tatou Tatouay, Azara.

*Hab.* Brazil, S<sup>ta</sup> Catharina; Surinam (Krauss); Guiana; Peru; Paraguay.

In a young specimen not in a good state, in the British Museum, the plates of the dorsal shield are eroded, with a prominent ridge on each side.

See also:—1. *Dasypus verrucosus*, Wagler, Seba, Thesaur. t. 30. f. 4; Cuvier, Oss. Foss. v. p. 120; Burm. Ther. Bras. p. 287.

2. *D. gymnurus*, P. Max. and Wagner. Appear like varieties or synonyma.

What is *Xenurus nudicaudus*, Lund, Turner, P. Z. S. 1851, p. 219, from "Tail shorter and more entirely naked" (Cuvier, Oss. Foss.)?

\*\* *Nose of skull short, compressed.* *Xenurus.*

2. *Xenurus hispidus.*

Skull short; nose short, compressed; nasal bones short.

*Dasypus hispidus*, Burmeister, Thiere Bras. i. p. 287; Giebel, Zeitschrift, 1861, p. 93, t. 2, 34. f. 3, 4 (skulls of old and young).

? Tatu, Seba, Thes. i. t. 30. f. 2, according to Burmeister.

Cabassou, Cuv. Oss. Foss. v. p. 120.

*Xenurus hispidus*, Gray, P. Z. S. 1865, p. 378.

*Hab.* Brazil.

In our skulls of *X. uncinatus* the distance from the perforation under the orbit to the end of the intermaxillary is  $1\frac{3}{4}$  inch; in Giebel's figure it is  $1\frac{1}{2}$  inch.

I have not seen this species. The skull figured by Giebel is that of a *Xenurus*, judging from the constriction of the brain over the orbit; but the face is very much shorter than in the skulls of *X. uncinatus* in the British-Museum collection.



## Fam. 4. TOLYPEUTIDÆ.

The dorsal disk only united to the body by the centre of the back, free from the hairy skin on the sides. The scapular and pelvic shields large, convex, separated by three free central rings. Feet weak; front with elongated unequal claws, on the tips of which the animal walks; hind feet club-shaped, with flat ovate nails; palms and soles covered with plates. Tail short. Skull attached to the frontal shield by two or more bony prominences. *Spherochlamydes*.

*Tolypeutina*, Gray, *P. Z. S.* 1865, p. 361.

The animal has the power of bending the body so as to form a nearly perfect sphere, the shield on the head and the short tubercular tail filling up the aperture occasioned by the notches in the scapular and pelvic shields. It walks on the small end of the elephant-like hind feet, and on the tips of the slender, elongated, middle claws of the fore feet.

## TOLYPEUTES.

Head with a flat frontal shield, hinder edge prominent; ears granular. Frontal shield narrow, produced above the head, and truncated behind. Nape without any plates. Scapular and pelvic shields large, convex; central rings three, free. Tail conical; base broadly expanded; end conical, rather compressed; under surface convex. Toes 4 before, 5 behind; inner and outer small; front claws unequal; two middle elongate, large. The hind feet small; toes indistinct, united; claws ovate, flat, nearly like the human nail. Skull elongate, slender; nose conical; intermaxillary toothless. Teeth large.

*Osteology*.—Cuv. *Oss. Foss.* v. p. 123; Turner, *P. Z. S.* 1851, p. 215.

Apar, *Geoff. Compt. Rend.* 1847, xxiv. p. 572.

*Cheloniscus*, *Fab. Column.*

*Tolypeutes*, *Illiger, Prod.* 1811; Gray, *P. Z. S.* 1865, p. 379.

The underside of the body covered with long bristly hairs; the outer plate of the moveable rings thin, with a frill of elongate rigid hairs on the outer edge. The bodies of the males are less ventricose and more elongate than those of the females; the hair on the underside of the males is grey, in the females it is blackish; the male organ is very large and, when contracted, cylindrical and pendulous. They are very active, running with rapidity, but looking very insecure, on their slender limbs. They are called "Tatu bola" by the Brazilians.

1. **CHELONISCUS.** *Skull with a bony prominence above each orbit for attaching the frontal shield. Toes 5.5; tail conical, base thick, end broad, flat, truncated, underside flattish; frontal shield broad and arched above.*

*Tolypeutes*, § *Cheloniscus*, Gray, *P. Z. S.* 1865, p. 379.

1. **Tolypeutes tricinctus.** (Apar.)

B.M.

Frontal shield flat, broad; the hinder margin not produced above the head; regularly arched. Nape with three bony plates in front of the scapular shield. Front claws five; the inner and outer ones small; the middle one moderately large.

*Dasypus tricinctus*, Linn. *S. N.* i. p. 53; Schreb. *Säugeth.* p. 215, t. 71.

*Dasypus apar*, Desm. *Mamm.* p. 367, t. 26. f. 3.

*Tatusia apar*, Lesson, *Mam.* p. 310.

*Tatusia tricincta*, Gray, *Cat. Mamm. B. M.* p. 181; Gerrard, *Cat. Bones B. M.* p. 286.

*Tolypeutes tricinctus*, Turner, *P. Z. S.* 1851, p. 215; Gray, *P. Z. S.* 1865, p. 379.

*Dasypus (Tatusia) tricinctus*, Rapp, *Edent.* p. 9.

*Apar*, Buffon, *H. N.* x. p. 206.

*Hab.* Bolivia; Buenos Ayres.

Fig. 46.



Skull of *Tolypeutes tricinctus*.

2. **TOLYPEUTES.** *Skull without any bony prominence above each orbit. Toes 4.5. Tail, base broadly expanded, end conical, beneath convex. Frontal shield narrow, flat.*

2. **Tolypeutes conurus.** (Mataco.)

B.M.

Frontal shield flat, narrow, produced behind the head into a kind

of hood, and truncated on the hinder edge. Nape without any tesserae. Front claws four, the outer one small, the middle one very large and strong.

*Dasypus* (Tolypeutes) *conurus*, *Is. Geoff. Compt. Rend.* 1847; *Rev. Zool.* 1847, p. 135; *Burmeister, Reise d. La Plata-St.* ii. p. 427;

*Giebel, Zeitschrift*, 1861, p. 93, t. (skull).

*Tolypeutes conurus*, *Gray, P. Z. S.* 1865, p. 380.

*Mataco, Azara*, ii. p. 161.

*Hab.* South America, La Plata (*Burmeister*).

The specimen living in the Gardens of the Zoological Society, I have been informed by Mr. Bartlett and Dr. Peters, has only three front claws; all those in the British Museum have four, which appears to be the normal number. In other respects the animals are similar. The shell of the living animal is blackish brown. The skin between the central rings is brown, bald, and smooth. The animal sleeps rolled up with its head downwards.

The skull that Giebel (*Zeitschrift*, 1861, t. 234. f. 2) figures as that of *Dasypus conurus*, I am assured by Dr. Burmeister, belongs to this species; it is unlike the skull of *Tolypeutes tricinctus* in not having any tubercles over the orbits; I was doubtful, as one of the skulls figured on these plates is wrongly determined, the one named *D. villosus* being *D. sexcinctus*.

## [Fam. GLYPTODONTIDÆ.

Dorsal shield entire, not revolute, immoveably affixed to the upper part of the very large pelvis.

Genera:—1. *Glyptodon*, Owen; 2. *Panochthus*, Burm.; 3. *Hoplophorus*, Lund (*Schistopleurum*, Nodot.).

Dr. Burmeister thinks there is a ventral shield; but in the figure it is only "hypothetically indicated;" and he calls the group *Biloricata* (Burm. Ann. & Mag. N. H. 1864; *Anales del Museo Publico de Buenos Aires*, iii. 1866, p. 183, t. 6). The head is probably contractile under the dorsal shield.]

## Fam. 5. CHLAMYDOPHORIDÆ.

The dorsal disk divided into two parts behind, forming an elongated dorsal and short pelvic shield; the latter is attached to the bones of the pelvis.

*Chlamydophorina*, *Gray, P. Z. S.* 1865, p. 381.



*Synopsis of the Genera.*

1. **CHLAMYDOPHORUS.** The dorsal shield only attached by the middle of the back, which is covered with hair on the sides.
2. **BURMEISTERIA.** The dorsal shield attached to the skin to its edge.

1. **CHLAMYDOPHORUS.**

The dorsal disk free beneath, only attached to the middle of the back. Pelvic shield and the tail covered with *tesserae*. The sides of the back under the shield, the underside of the body, and limbs covered with silky hair.

*Osteology*.—Yarrell, Zool. Journ.; Turner, P. Z. S. 1851, p. 213; Gray, P. Z. S. 1857, p. 8 (fig. pelvis); Ann. N. H. xix. 1857, p. 492.

*Chlamyphorus*, Harlan; Rapp, Edent. p. 12; Gray, P. Z. S. 1865, p. 381.

*Dasypus* (*Chlamyphorus*), Fischer, Syn. p. 394.

*Chlamyphorus*, Gray; Burmeister.

***Chlamyphorus truncatus.* (Pichiciago.) B.M.**

*Chlamyphorus truncatus*, Harlan, Acad. Lyc. Nat. Hist. N. York, 1825, t. ; Burmeister, Reise La Plata-St. i. p. 297, ii. p. 429; Rapp, Edent. p. 22; Yarrell, Zool. Journ. iii. p. 544, 1837; Gray, P. Z. S. 1865, p. 381.

*Chlamyphorus truncatus*, Gray, P. Z. S. xxv. 1857, p. 9 (skeleton); Burmeister, Ann. & Mag. N. H. xi. (1863) p. 308.

*Hab.* Chili, Mendoza.

2. **BURMEISTERIA.**

The dorsal shield attached to the skin of the back to the edge. The pelvic disk and the tail only partly covered with *tesserae*. The sides and underpart of the body and limbs covered with woolly hair.

*Burmeisteria*, Gray, P. Z. S. 1865, p. 381.

*Chlamyphorus*, sp., Burmeister.

***Burmeisteria retusa.***

The plates of the dorsal shield with one or two bristles on the hinder edge; those on the sides of the back with many bristles on the lower edge. The upper part of the pelvic disk with pencils of bristles.

*Chlamyphorus retusus*, Burmeister, Abh. Naturf. Ges. zu Halle, vii. p. 167, t. 1, 1863; Ann. & Mag. N. H. 1863, xi. p. 308.

*Burmeisteria retusa*, Gray, P. Z. S. 1865, p. 381.

*Hab.* Bolivia; Santa Cruz de la Sierra (*Burmeister*).

Larger than *Chlamyphorus truncatus*.

Section III. *Body covered with hair or spines, not with armour.*

### Fam. 6. ORYCTEROPODIDÆ.

Body covered with bristles. Head conical; mouth large. Teeth numerous. Toes 4.5; inner front wanting; three middle longest. Claws broad.—*Gray, P. Z. S. 1865, p. 382.*

*Osteology.*—Cuvier, *Oss. Foss. v. p. 139, t. 12*; Turner, *P. Z. S. 1851, p. 220*; Rapp, *Edent. t. 4*; Sundevall, *Kong. Vet. Akad. Hand. 1841, x. p. 236, t.*

*Myrmecophagina* (partly), *Gray, Cat. Mamm. B. M. p. 190.*  
*Orycteropodidæ*, *Turner, l. c. p. 220*; *Gray, P. Z. S. 1865, p. 382.*  
*Fodientia*, *Giebel, Säugeth. p. 412.*

### ORYCTEROPUS.

Character of family.

#### 1. *Orycteropus capensis.* (Aard Vark.) B.M.

Facial line nearly straight; the nose elongate, thick, scarcely attenuated.

*Myrmecophagus capensis*, *Gmelin, S. N. i. p. 53.*

*Myrmecophagus afra*, *Pall. Misc. Zool. p. 64.*

*Orycteropus capensis*, *Geoff.; Desm. Mamm. p. 372*; *Gray, Cat. Mamm. B. M. p. 190*; *P. Z. S. 1865, p. 382*; *Gerrard, Cat. Bones B. M. p. 287*; *Smuts, Mam. Cap. p. 52*; *Sundevall, l. c. 1841, p. 228*; *Owen, Odont. t. 76. f. 8, 9, 11, t. 77, 78*; *Rapp, Edent. p. 13, t. 1-4 (skull)*; *Duvernoy, Ann. Sci. Nat. xix. p. 192, t. 96 (skull).*

*Cochon-de-terre allemand*, *Buffon, H. N. v. t. 2*; *Camper, Act. Petrop. 1777, p. 222, t. 4. f. 6 (skull).*

*Oryctérope*, *Cuv. Oss. Foss. v. t. 12 (skeleton).*

*Oryctérope du Cap*, *Cuv. Oss. Foss. v. p. 117, t. 12 (skull).*

*Hab.* South Africa, Cape of Good Hope.

#### 2. *Orycteropus æthiopicus.*

Forehead before the eyes, shelving; the nose short, thin; the first front toe longer than the rest.

*Orycteropus æthiopicus*, *Sundevall, Kong. V. Akad. Hand. 1841, p. 226, t. 3. f. 1-5*; *Rapp, Edent. p. 13*; *Gray, P. Z. S. 1865, p. 382.*

*Hab.* Sennaar (*Hedenborg*).

#### 3. *Orycteropus senegalensis.*

? *Orycteropus senegalensis*, *Lesson, Mam. p. 277*; *Duvernoy, Ann. Sci. Nat. xix. p. 192, t. 9, 1853.*

*Hab.* Senegal. May be the same as the former.

## Fam. 7. MYRMECOPHAGIDÆ.

Body covered with hair. Head conical, elongate; mouth small. Teeth none.

*Edentata genuina*, Cuvier, *Oss. Foss.* v. p. 97.

*Myrmecophagidæ*, Turner, *l. c.* p. 217; Gray, *P. Z. S.* 1865, p. 383.

*Myrmecophagina*, Gray, *Cat. Mamm. B. M.* p. 190.

*Myrmecophaga*, Linn. *S. N. i.* p. 52.

*Lipodonta*, Nitzsch.

*Vermilingua*, Ill. *Prodr.*

The ribs of the animals of this family are flat and more or less dilated on the outer side; they are most dilated in the *Cyclothuri*, where they are expanded nearly their whole length, and so much so that they overlap each other, and form a complete armour to the thoracic viscera. The figure given by Rapp agrees with the skeletons in the British Museum. The ribs of the skeleton of *Myrmecophaga* figured by Cuvier (*Oss. Foss.* v. t. 9) and Rapp (*Edentata*, t. 6) are only dilated on the middle of the outer side, and not there to such an extent as in the above-named genus.

*Synopsis of the Genera.*

\* *Terrestrial. Tail bristly. Teeth 5.*

1. MYRMECOPHAGA. Tail covered with long hair.

\*\* *Arboreal. Tail conical, prehensile.*

2. TAMANDUA. Teeth  $\frac{5}{4}$ ; covered with short hair.

3. CYCLOTHURUS. Teeth  $\frac{3}{2}$ ; covered with silky hair.

a. *Terrestrial. Tail bristly; walking on side of feet, with claws curved up.*

1. MYRMECOPHAGA.

Toes 4.5. Palatine and pterygoid bones united beneath the nasal canal for its whole length. Fur of body and tail elongate, flaccid. Tail very bushy, lax. Skull very long, very slender; nose very slender, much longer than the brain-case. Terrestrial, living solitary in marshes.

*Osteology*.—Cuvier, *Oss. Foss.* v. p. 97, t. 9; Rapp, t. 46.

*Myrmecophaga*, Gray, *P. Z. S.* 1865, p. 383.

*Myrmecophaga jubata.*

Fur blackish grey, mixed; hind limbs and a mark running obliquely from the shoulders upwards and backwards black.

*Myrmecophaga jubata*, Linn. *S. N. i.* p. 52; Gerrard, *Cat. Bones B. M.* p. 288; Rapp, *Edent.* p. 14, t. 46 (skull); Gray, *P. Z. S.* 1865, p. 383.



*Myrmecophaga tridactyla*, Linn. S. N. ed. 10, p. 35.

*Myrmecophaga sciurea*, Pallas, Misc. p. 65.

Tama noir, Buffon, H. N. x. p. 144, t. 29; Supp. iii. t. 55; Cuvier, Oss. Foss. v. p. 97, t. 9.

Great Ant-eater, Penn.

*Hab.* South America, La Plata.

*Anatomy.*—See Owen, P. Z. S. 1837, p. 22; Ann. & Mag. N. H. xix. p. 59; Trans. Zool. Soc. iv. p. 117; Rapp, Edent. t. 46 (skeleton); Cuvier, Oss. Foss. v. t. 9 (skeleton).

*b.* Arboreal. Tail conical, prehensile; feet clasping the branches.

## 2. TAMANDUA.

Toes 5. 4. Palatine and pterygoid bones united beneath the nasal canal for the whole length. Fur of body and tail short, bristly. Tail tapering, prehensile. Skull long, slender; nose nearly as long as brain-case (Rapp, t. 5). Living on trees.

*Tamandua*, Gray, P. Z. S. 1865, p. 383.

The tongue (figured by Rapp, Edent. t. 6. f. 4) is elongate, cylindrical, rather tapering, covered with rings of acute tubercles, and with a globular end.

### 1. *Tamandua bivittata*. (Collared Tamandua.) B.M.

Head, shoulders, fore limbs, outside of hind limbs, and middle of the tail white; a stripe from each side of the neck over the shoulder and remaining part black. "Tail but little longer than the body; its terminal third scaly."—Turner.

*Var.* Black less intense.

*Myrmecophaga tridactyla*, Linn. S. N. p. 51.

*Myrmecophaga tetradactyla*, Linn. S. N. p. 52; Rapp, Edent. p. 14, t. 3 b, t. 5 (skull).

*Myrmecophaga tamandua*, Cuv.; Desm. Mamm. p. 374; Blainv. Ostéogr. t. (skeleton).

*Tamandua tetradactyla*, Lesson; Gray, Cat. Mamm. B. M. p. 191; Gerrard, Cat. Bones B. M. p. 288; Turner, P. Z. S. 1851, p. 218; Desm. N. Dict. H. N. xii. p. 107; Massmann, Descr. 1823, t. 2 (skull).

*Myrmecophaga bivittata*, Desm. N. Dict. H. N. xii. p. 107.

*Myrmecophaga nigra*, Geoff.; Desm. N. Dict. H. N. xii. p. 107.

*Myrmecophaga myosura*, Pallas, Miscell. p. 64.

*Myrmecophaga ursina*, Griff. A. K. p. 16.

*Myrmecophaga crispus*, Rüpp. Mus. Senck. iii. p. 179.

*Tamandua bivittata*, Gray, P. Z. S. 1865, p. 384.

*Tamandua*, Buffon, H. N. x. p. 144; Cuvier, Oss. Foss. v. p. 101.

Middle Ant-eater, Penn.

*Hab.* Brazil; Paraguay.

*Myrmecophaga annulata* (Desm. Mamm. p. 374, from Krusenstern, Voyage, t. fig., altered Griffith, A. K. t. 144) and *M. annulata* et *M. striata* (Shaw, from Buff. H. N. Supp. iii. t. 56) are only a *Coati (Nasua)* disfigured.

## 2. *Tamandua longicaudata*. (Yellow Tamandua.) B.M.

Uniform light ochraceous, with a paler vertebral line; tail nearly double the length of the body, its terminal half covered with small scales and a few scattered black hairs; ears large, rounded, about one-third the length of the head; no shoulder-streak.

*Myrmecophaga longicaudata*, *Wagner*; *Turner*, *P. Z. S.* 1851, p. 218; *Burm. Ther. Bras.* p. 304.

*Tamandua longicaudata*, *Gray*, *P. Z. S.* 1865, p. 384.

*Hab.* —? (B. M. and Zool. Soc.).

## 3. CYCLOTHURUS.

Toes 2.5; the outer front one much the largest. Pterygoid bones meeting, presenting two long, parallel, and little-prominent crests, and much extended backward, and not forming a canal. Skull short, broad; nose moderate, slender, shorter than the brain-case. The ribs are very broad, dilated, forming a solid armour to the chest, and overlapping each other (see *Rapp*, t. 5. f. 3, 4, 5).

*Cyclothurus*, *Gray*, *List Mamm. B. M.*; *P. Z. S.* 1865, p. 384; *Turner*, *P. Z. S.* 1851, p. 218.

### 1. *Cyclothurus didactylus*.

B.M.

Fulvous, blackish-washed; feet and tail grey; longer hairs with minute black tips.

*Myrmecophaga didactyla*, *Linn. S. N. i.* p. 51; *Rapp, Edent.* p. 15, t. 5. f. 3-6 (skull); *Blainv. Ostéogr. t.* (skeleton); *Massmann, Descript.* 1823, t. 1.

*Myrmecophaga minima*, *Brisson, R. A.* p. 28.

*Cyclothurus didactylus*, *Lesson*; *Gray, Cat. Mamm. B. M.* p. 191; *P. Z. S.* 1865, p. 385.

Little Ant-eater, *Edw. Glean. i.* p. 220, t. 220.

Fourmilier à deux doigts, *Cuv. Oss. Foss. v.* p. 103.

*Hab.* South America, Brazil.

### 2. *Cyclothurus dorsalis*.

B.M.

Golden yellow, silky; back with a broad, well-defined black stripe; feet and tail yellow.

*Cyclothurus dorsalis*, *Gray, P. Z. S.* 1865, p. 385, t. 19.

*Hab.* Costa Rica (*Salvin*).

The back and sometimes the sides are washed with blackish. Always known by the distinct, well-defined, broad dorsal streak, and the yellow colour of the feet and tail.

## Suborder III. MONOTREMATA.

Pelvis with marsupial bones. Tongue elongate. Face like a beak. Insectivorous.

Monotrema, *Geoff.*

Reptantia, *Illiger.*

## Fam. 8. ORNITHORYNCHIDÆ.

Body covered with hair or spines. Mouth in the form of a flat, depressed, or slender beak, subcylindrical. Hind feet of the male spurred. Skeleton with marsupial bone, and a merrythought (*furcula*) like that of birds.

Ornithorhynchidæ, *Gray, P. Z. S.* 1865, p. 385.

*Synopsis of the Genera.*

1. PLATYPUS. Head depressed. Body covered with fur. Feet expanded, webbed.
2. ECHIDNA. Head slender, conical, tapering. Body covered with spines. Feet with long claws.

## 1. PLATYPUS.

Beak depressed. Body covered with hair. Tail broad, short, depressed. Feet very short. Toes 5.5; front toes united by a web. Hind feet with an acute spur on the inner side.

Platypus, *Shaw, Viv. Nat.* 1799; *Gray, P. Z. S.* 1865, p. 385.

Ornithorhynchus, *Blumenbach, Handb.* p. 135, 1800.

Ornithorhynque, *Cuv. Oss. Foss.* t. 14.

Demipus, *Wiedm. Zool. Arch.* i. p. 175.

## Platypus anatinus.

Platypus anatinus, *Shaw, Nat. Misc.* t. 385; *Gen. Zool.* i. p. 229, t. 66, 67, 1799; *Gerrard, Cat. Bones B. M.* p. 288; *Gray, P. Z. S.* 1865, p. 385.

Demipus anatinus, *Wiedm. Zool. Arch.* i. p. 175, t.

Ornithorhynchus paradoxus, *Blumenb. Handb.* ed. 10, p. 135; *Abbild.* t. 41, 1800; *Home, Phil. Trans.* 1802, p. 87.

Ornithorhynchus anatinus, *Gould, Mamm. Austr.* i. t. 1.

Ornithorhynchus brevirostris, *Ogilby, P. Z. S.* 1831, p. 150.

Ornithorhynchus rufus, *Leach, Zool. Misc.* p. 136.

Ornithorhynchus fuscus, *Leach, Zool. Misc.* ii. p. 136, t. 111.

Ornithorhynchus crispus et *O. lævis*, *Macgillivray, Mem. Wern. Soc.* v. p. 127.

Duck-billed Platypus, *Shaw.*

Ornithorhynque, *Cuv. Oss. Foss.* v. p. 143, t. 14 (skeleton).

*Hab.* South-eastern Australia and Van Diemen's Land.



## 2. ECHIDNA.

Beak elongate, cylindrical, attenuated. Mouth small, terminal.  
Tongue very long. Body covered with spines. Tail very short.  
*Osteology*.—Cuv. *Oss. Foss.* t. 13 (shield).

*Echidna*, Cuv. *Tabl. Elém.* p. 143, 1797; Gray, *P. Z. S.* 1865, p. 386.  
*Tachyglossus*, Illiger, *Prodr.* 1811.  
*Ornithorhynchus*, sp., Home.  
*Myrmecophaga*, sp., Shaw.

***Echidna aculeata.***

*Echidna aculeata*, Gray, *P. Z. S.* 1865, p. 386.  
*Echidna australiensis*, Less. *Mam.* p. 318.  
*Echidna hystrix*, Cuv. *R. A. i.* p. 226; Leach, *Zool. Misc.* ii. t. 90;  
Gould, *Mamm. Austr.* i. t. 2; Gerrard, *Cat. Bones B. M.* p. 288.  
*Echidna longiaculeata*, Tiedem., *Zool.* i. p. 592.  
*Myrmecophaga aculeata*, Shaw, *Nat. Misc.* t. 109, 1792.  
*Tachyglossus aculeatus*, Illiger; Schreb. *Säugeth.* t. 63 B.  
*Tachyglossus hystrix*, Wagner; Schreb. *Säugeth.* iv. p. 242.  
*Ornithorhynchus hystrix*, Home, *Phil. Trans.* 1802, p. 348.  
Porcupine Ant-eater, Shaw.  
*Echidne*, Cuvier, *Oss. Foss.* v. pp. 144, 613 (skeleton).

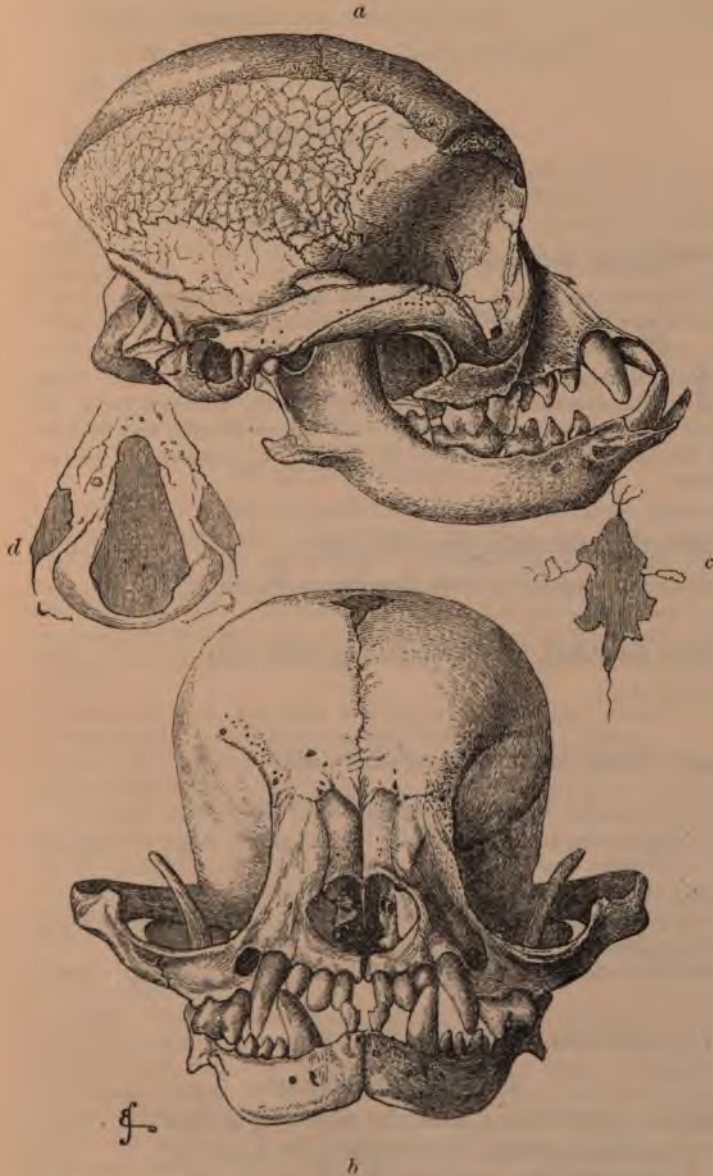
*Hab.* Australia.

*Var.* More hairy.

*Echidna setosa*, Cuv. *R. A. i.* p. 226, 1817; Gould, *Mamm. Austr.* i.  
t. 8.  
*Echidna brevicaudata*, Tiedemann, *Zool.* i. p. 392.  
*Tachyglossus setosus*, Illiger; Schreb. *Säugeth.* t. 63.

*Hab.* Van Diemen's Land.

Fig. 47.



Skull of Chinese Pug-nosed Lap-dog (*Canis familiaris chinensis*, p. 195) ;  
c, fontanel ; d, hinder end of skull.

## ADDITIONS.

**Viverricula malaccensis** (p. 47), add :—

*Viverra rasee*, *Peters, Reise Mossamb. Mamm.* p. 113.

*Viverra Schlegeli*, *Pull., Schl. Contributions, Nederl. Tijdsch.* iii. p. 78 ;  
*Schl. & Pull. Faune de Madag.* p. 16, t. 10.

*Hab.* Madagascar.

B.M.

A young specimen in the British Museum, received from Mr. Plant, agrees in all particulars with the Indian animal, and its head has not the colours that induced Dr. Schlegel to consider it a distinct species.

**Bdeogale crassicauda** (page 165), add :—

B.M.

Specimen in spirits, sent from Zanzibar by Dr. Kirk, 1869.

**Canis familiaris**, var. 3. *chinensis* (p. 195), add :—

Fig. 47. skull.

After **Vulpes mesomelas** (page 203), add :—

5 a. **Vulpes variegatoides** (Vaal Jackal).

*Canis variegatoides*, *A. Smith, S. A. Quart. Journ. ; Chapman, Travels.*

*Hab.* South Africa, in the mountains.

"Smaller than *V. mesomelas*, the back never black, and not found in the plains."—*Blyth.*

See also *Shualte* or *Barking Jackal*, Chapman, 'Travels,' p. 299.

After **Helarctos ornatus**, add (page 237) :—

4 a. **Helarctos † nasutus**.

Black ; nose brown ; a triangular white spot on chest.

*Ursus nasutus*, *Sclater, P. Z. S.* 1868, p. 72. fig. a, t. 8.

? Venezuelan Bear, *Ker Porter, P. Z. S.* 1833, p. 114.

*Hab.* America, Venezuela ?



4 b. *Helarctos? frugilegus*.

"Uniform blackish brown, beneath brown."

*Ursus frugilegus*, *Tschudi, Faun. Peru. Mamm.* p. 90.

*Hab.* Peru.

*Cercoleptes caudivolvulus* (p. 245), add:—

The Kinkajou was formerly considered a Lemur; and the manner in which it uses its feet as hands might well mislead a casual observer. I saw one the other evening in the Zoological Gardens resting on its rump with the tail coming out in front between its hind legs. It was holding in its fore feet a slice of bread; and every now and then it would take off a piece with one or the other of its fore feet, and hold it as in a hand to its mouth, or take from it small pieces with the other hand like a child eating a cake, and quite as handily; yet this animal has no opposite thumb on any of the feet, and only short fingers and toes webbed nearly to the claws. —Gray, *P. Z. S.* 1865, p. 680.

*Rhinaster keitloa* (page 317).

A skeleton of a full-grown female animal in the British Museum, collected by Mr. Jesse in Abyssinia (wanting the hinder horn). The front horn is 16 inches long; it is nearly circular at the base; the upper half is much more slender, tapering and rather compressed at the end. The hinder horn is said to have been about half the length of the front one, compressed and rather sharp-edged, the section in the middle of the horn being about three times as long as wide.

Compared with the skull and horns of a younger animal of *R. bicornis* in the British Museum, received from Mr. Petherick.

The horns differ in being more compressed and the front horn more slender at the upper part; but this may depend on the sex.

The skull differs from *R. bicornis* in being much broader in front, at the hinder part of the base of the front horn, and especially between the orbits; the face is much more bulky and convex on the sides, not flat and tapering in front as in *R. bicornis*. The hinder occipital crest is more expanded backwards, the forehead flat and broad behind, but wide, convex, and shelving on the sides under the base of the hinder horns. There can be no doubt of this being a distinct species.

Length from nasal to condyle 23 inches, from nasal to occipital crest 22 inches, from nasal to orbit 10 inches, nasal to condyle of jaw 19 inches 6 lines, of teeth-line 10 inches 6 lines, of lower jaw 18 inches; height of skull 18 inches, of ramus of lower jaw 8 inches; width at occipital end 9 inches 8 lines, between zygomatic arches 12 inches 6 lines, of forehead 9 inches 6 lines, of nose 5 inches 6 lines.

The skull of *R. keitloa* described by Camper is in the Museum at Groningen.—*Vrolik, Ann. Sci. Nat.* vii. p. 24.

After *Potamochoerus africanus* (p. 341), add :—

“The Boesh Vark (*Sus larvatus*) inhabits the reedy margins of vleys. It is said that they intermingle with the domesticated breeds, and that the hybrid is prolific.”—*Layard*.

THE END.





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